

NATIONAL RESEARCH COUNCIL
NATIONAL ACADEMY OF SCIENCES - NATIONAL ACADEMY OF ENGINEERING

STATUS REPORT NO. 87

March 1, 1986 to May 31, 1986

Contract NASW - 3458

Postdoctoral and Senior Postdoctoral
Resident Research Associateship Program
and Research Management Associateship Program

for the

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

({NASA-CR-177203) POSTDOCTORAL AND SENIOR N86-28003
PCSTDCCTORAL RESIDENT RESEARCH ASSOCIATESHIP
PROGRAM AND RESEARCH MANAGEMENT
ASSOCIATESHIP PROGRAM FOR THE NATIONAL
{National Academy of Sciences - National G3/80 43316

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Office of Scientific and Engineering Personnel
National Research Council
National Academy of Sciences - National Academy of Engineering
2101 Constitution Ave., N. W.
Washington, D. C. 20418

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NRC-NASA

STATUS REPORT NO. 87

March 1, 1986-May 31, 1986

This report provides information on the status of all Resident Research Associates and Research Management Associates in this quarter. Part I lists alphabetically by laboratory all Associates whose tenure continued as of June 1, 1986; it includes their countries of citizenship and dates of tenure. Part I also includes those Associates who began tenure during this reporting period (indicated by an asterisk appearing before their names); information on these new Associates is provided in the following format:

*Name: Citizenship; dates of tenure; year of doctoral degree, institution granting doctorate, field of study; stipend; and title of research work.

Senior Associates are designated by an "S" following their names. For those Associates who renewed during this period, the renewal starting date is underscored, and the length of renewal and the amount of the renewal stipend are noted.

A "+" appears before the name of any Associate who has a special situation that does not follow the routine reports procedure. Detailed information on the situation is included in these special cases.

Part II of this report lists all Associates who terminated during the reporting period. The Associates are listed alphabetically by laboratory, with dates of tenure and name of their advisors.

Part II also shows whether Associates and advisers have met their reporting obligations. Associates and their advisers are required to write termination reports and final evaluations, respectively. Copies of such papers received during this period are included as an appendix to this report.

Part III provides an update of report information on Associates who terminated prior to this reporting period. Associates are listed alphabetically by laboratory.

Part IV is a list of Progress Reports received during this reporting period.

From the beginning of the Associateship Program in 1959, appointments have been held by 2,498 scientists from 64 countries (including "Stateless" status). In addition, some new appointees have not yet begun tenure.

During the three months covered by this report and on June 1, 1986, 181 Associates were on tenure although they did not all start at the same time. Their distribution at NASA Centers is shown below.

	On tenure as of 3/01/86	On tenure as of 6/01/86
<u>AMES RESEARCH CENTER</u>	51	50
Dryden Flight Research Center	0	0
<u>EARTH RESOURCES LABORATORY</u>	1	1
<u>GODDARD SPACE FLIGHT CENTER</u>	41	39
Institute for Space Studies	3	2
Space Flight Center-Greenbelt	38	37
Wallops Flight Center	0	0
<u>JET PROPULSION LABORATORY</u>	36	36
<u>LANGLEY RESEARCH CENTER</u>	18	20
<u>LEWIS RESEARCH CENTER</u>	15	14
<u>LYNDON JOHNSON SPACE CENTER</u>	11	12
<u>MARSHALL SPACE FLIGHT CENTER</u>	8	8
<u>NASA HEADQUARTERS (RMA Program)</u>	0	1
 TOTALS	 181	 181

The Associates who were on tenure as of June 1, 1986, are citizens of the following countries:

Argentina	1	Greece	1	New Zealand	1
Australia	1	Iceland	1	Pakistan	2
Austria	1	India	19	Peru	1
Belgium	1	Iran	1	Sweden	2
Canada	4	Israel	11	Switzerland	2
Columbia	1	Italy	2	Taiwan (R.O.C.)	5
Finland	3	Japan	11	Turkey	1
France	4	Korea	4	United Kingdom	6
Germany, Federal		Mexico	1	United States	87
Republic of	4	Netherlands	3	TOTAL	181

During the period of this report, 22 Associateships were renewed. The distribution of renewal appointments by NASA Center is shown below:

	<u>Renewals Offered</u>
Ames Research Center	5
Dryden Flight Res. Center	0
Earth Resources Laboratory	0
Goddard S. F. C. & I. S. S.	4
NASA Headquarters	1*
Jet Propulsion Laboratory	5
Langley Research Center	2
Lewis Research Center	2
Lyndon Johnson Space Center	2
Marshall Space Flight Center	1
Wallops Flight Center	0
TOTAL	22

*Transferred from Johnson Space Center

Part I

Associates on Tenure as of June 1, 1986

AMES RESEARCH CENTER, Moffett Field, California

ADAIR, Desmond: United Kingdom; February 13, 1986-February 12, 1987.

BLACKBURN, Thomas E.: United States; July 10, 1984-July 9, 1986.

CARBON, Duane F. (S): United States; January 6, 1986-January 5, 1987.

CASTELAZ, Michael W.: United States; October 11, 1984-October 10, 1986.

*CHUNG, Song-Young: Korea; May 5, 1986-May 4, 1987
Ph.D. 1986, MIT, Aeronautics; \$31,500; "Computation of a Hovering Rotor Wake Flow Field."

+COHEN, Yehuda (S): Israel; August 14, 1984-July 30, 1986.
Split tenure from March 13, 1986 to June 25, 1986

DEANS, Stanley R. (S): United States; October 1, 1984-September 30, 1986.

*DOBROVOLSKIS, Anthony (S): United States; April 25, 1986-April 24, 1987.
Ph.D. 1978, California Institute of Technology, Pasadena, Planetary Science; \$37,000; "Theoretical and Experimental Studies of Planetary Atmospheres."

EWEL, Katherine C. (S): United States; January 21, 1986-July 20, 1986.

+FREUND, Friedmann (S): Germany; March 11, 1985-March 10, 1987.
Split tenure from March 10, 1986 to August 1986.

FUKUNISHI, Yu: Japan; September 17, 1984-September 16, 1986.

GRUNWALD, Arthur J. (S): The Netherlands; September 3, 1985-September 2, 1986.

HALPRYN, Bruce M.: United States; June 27, 1983-June 26, 1986.

HERMANN, Robert (S): United States; October 1, 1984-September 30, 1986.

+HEYMANN, Michael (S): Israel; August 1, 1983-September 23, 1986.
Split tenure (9 months) September 30, 1984-June 24, 1985, and October 11, 1985-June 1986.

- INOUE, Osmu (S): Japan; April 8, 1985-April 7, 1987.
Renewed for 12 months beginning April 8, 1986, at a stipend rate of \$38,110.
- *JOHNSON, Walter William: United States; April 7, 1986-April 6, 1987.
Ph.D. 1985, Ohio State University, Columbus, Psychology; \$26,350; "The Role of Cognitive Schedules in Multi-Task Performance and Workload."
- KANAVARIOTI, Anastassia: Greece; January 15, 1985-January 14, 1987.
- KANKI, Barbara G.: United States; October 21, 1985-October 20, 1986.
- KATZ, Joseph (S): Israel; July 30, 1984-August 29, 1986.
- KAWAMURA, Tetuya: Japan; October 24, 1985-October 23, 1986.
- KRISTJANSSON, Hordur: Iceland; February 29, 1984-July 31, 1986.
Renewed for 2.5 months beginning May 15, 1986, at a stipend rate of \$27,200.
- LAMB, Susan A. (S): United States; December 12, 1985-August 11, 1986.
- LARIMER, James (S): United States; January 23, 1986-January 22, 1987.
- LASSILA, David H.: United States; December 13, 1984-December 12, 1986.
- LEE, DUCKJOO: Rep. Korea; August 20, 1985-August 19, 1986.
- LEE, Moon Joo: Rep. Korea; November 25, 1985-November 24, 1986.
- LIFSHITZ, Jacob M. (S): Israel; August 1, 1985-July 31, 1986.
- LINDNER, Bernhard L.: United States; June 21, 1985-June 20, 1986.
- MANCINNELI, Rocco L.: United States; July 6, 1984-July 5, 1986.
- +MERHAV, Shmuel J. (S): Israel; September 4, 1984-October 3, 1986.
Split tenure October 3, 1985-July 1, 1986.
- OWENSON, Brian D.: United States; June 17, 1985-June 16, 1986.
- PALMISANO, Anna C.: United States; November 4, 1985-November 3, 1986.
- PETTERSSON, Lars: Sweden; September 23, 1985-September 22, 1986.
- PINTO, Joseph (S): United States; May 20, 1985-May 19, 1987.
Renewed for 12 months beginning May 20, 1986, at a stipend rate of \$38,625.
- RUMMEL, John D.: United States; January 7, 1985-January 6, 1987.

SANDFORD, Scott A.: United States; January 10, 1986-January 9, 1987.

SHOWALTER, Nark R.: United States; January 7, 1986-January 6, 1987.

SINGHAL, Rajendra (S): India; February 1, 1985-January 31, 1987.

SINTON, Douglas M.: United States; July 2, 1984-July 1, 1986.

STOKER, Carol R.: United States; October 15, 1985-October 14, 1986.

THOMPSON, Kevin W.: United States; June 6, 1985-June 5, 1986.

VANAJAKSHI, C. T.: Canada; April 4, 1985-April 3, 1987.

Renewed for 12 months beginning April 4, 1986, at a stipend rate of \$27,200.

VELGER, Mordekhai: Israel; May 29, 1985-May 28, 1987.

Renewed for 12 months beginning May 29, 1986, at a stipend rate of \$32,350.

VERHAEGEN, Michael H.: Belgium; December 18, 1985-December 17, 1986.

WENZEL, Elizabeth M.: United States; November 15, 1984-November 14, 1986.

WESTMAN, Walter E. (S): United States; October 1, 1985-September 30, 1986.

WOLFIRE, Mark: United States; November 12, 1985-November 11, 1986.

ZABARA, Jacob (S): United States; August 27, 1984-August 26, 1986.

ZAHNLE, Kevin J.: United States; September 16, 1985-September 15, 1986.

EARTH RESOURCES LABORATORY

LIEBERMAN, Milton E. (S): United States; June 1, 1985-August 31, 1986.

GODDARD INSTITUTE FOR SPACE STUDIES, New York, New York

CABOT, William Henry: United States; February 3, 1986-February 2, 1987.

CARLSON, Barbara E.: United States; September 4, 1984-September 3, 1986.

GODDARD SPACE FLIGHT CENTER, Greenbelt, Maryland

ACHARYA, Bannaje S.: India; November 1, 1984-October 31, 1986.

ADELMAN, Saul J. (S): United States; August 1, 1984-July 31, 1986.

- BARNARD, John : United States; September 17, 1984-September 16, 1986.
- BARTHELMY, Scott: United States; July 21, 1985-July 20, 1986.
- BJORAKER, Gordon Lee: United States; May 3, 1985-May 2, 1987.
Renewed for 12 months beginning May 3, 1986, at a stipend rate of \$27,200.
- BUERGI, Alfred: Switzerland; September 2, 1985-September 1, 1986.
- CROWLEY, Thomas J. (S): United States; February 3, 1986-February 2, 1987.
- DERMER, Charles D.: United States; July 25, 1984-July 24, 1986.
- DESERT, Francois-Xavier: France; February 5, 1986-February 4, 1987.
- GOETZ, Francois: Switzerland; December 20, 1984-December 19, 1986.
- +GRAYZECK, Edwin J. (S): United States; September 3, 1985-July 31, 1986.
Split tenure from March 2, 1986 to June 1986.
- HAKKINEN, Sirpa, M. A.: Finland; June 1, 1985-May 31, 1987.
- *HYDE, William: Canada; March 3, 1986-March 2, 1987
Ph.D. 1985, University of Toronto, Canada, Physics; \$26,350; "Two Dimensional Energy Balance Model with an Explicit Cryosphere and Lithosphere."
- KAUFMAN, Michele (S): United States; January 21, 1986-June 20, 1986.
Renewed for 1 month beginning May 21, 1986, at a stipend rate of \$42,000.
- KOSUGI, Takeo: Japan; April 1, 1985-June 30, 1986.
Renewed for 3 months beginning April 1, 1986, at a stipend rate of \$26,250.
- KUNIEDA, Hideyo: Japan; February 24, 1986-February 23, 1987.
- LEISAWITZ, David T.: United States; October 30, 1985-October 29, 1986.
- *LEVINE, Elissa R.: United States; March 3, 1986-March 2, 1987.
Ph.D. 1984, Penn State University, University Park, Agronomy; \$27,200;
"Modelling Soil Genesis and its Effects on Bioproductivity and Nutrient Cycling."
- MAEZAWA, Kiyoshi (S): Japan; July 1, 1985-June 30, 1986.
- MARTENS, Petrus C. H.: The Netherlands; September 26, 1984-September 25, 1986.
- MASSMAN, William J. (S): United States; April 1, 1985-March 31, 1987.
Renewed for 12 months beginning March 31, 1986, at a stipend rate of \$32,445.

MITCHELL, Kenneth: United States; September 30, 1985-September 29, 1986.

O'CONNOR, William P.: United States; January 22, 1985-January 21, 1987.

OZEL, Mehmet E. (S): Turkey; February 10, 1986-February 9, 1987.

PALUMBO, Giorgio G. C.: Italy; August 29, 1985-August 28, 1986.

PERKO, John S.: United States; December 21, 1984-December 20, 1986.

PERSIC, Massimo: Italy; July 15, 1985-July 14, 1986.

*PRASAD, Coorg R. (S): India; March 4, 1986-March 3, 1987.

Ph.D. 1970, State University of New York, Stony Brook, Mechanical Engineering; \$43,000; "Studies on Lidar for Temperature and Water Vapor Measurement in Atmosphere."

ROBERT, D. Aaron: United States; January 15, 1986-January 14, 1987.

SCHAEFER, Robert K.: United States; September 3, 1985-September 2, 1986.

*TORRES, Ana V.: Mexico; March 3, 1986-March 2, 1987.

Ph.D. 1985, University of Colorado, Boulder, Astrophysics and Astroscience; \$26,350; "Continuum Energy Distribution of O-Type Stars."

VAN DE GRIEND, Adriaan: The Netherlands; October 1, 1985-September 30, 1986.

VATHSAL, Srinivasan (S): India; June 15, 1984-June 14, 1986.

VENKATESH, Y. V. (S): India; October 1, 1985-September 30, 1986.

VOORHIES, Coerte Van: United States; August 30, 1984-August 29, 1986.

VRTILEK, Saega D.: Pakistan; January 6, 1986-January 5, 1987.

ZUBER, Maria T.: United States; October 28, 1985-October 27, 1986.

JET PROPULSION LABORATORY, Pasadena, California

ANCELLET, Gerard M.: France; January 22, 1985-January 21, 1987.

BERATAN, David N.: United States; July 8, 1985-July 7, 1986.

BERTHIAS, Jean-Paul A.: France; September 17, 1985-September 16, 1986.

BOULANGER, Francois B.: France; February 1, 1985-January 31, 1987.

DENISON, Arthur B. (S): United States; January 6, 1986-September 5, 1986.

ELVIDGE, Christopher D.: United States; April 8, 1985-April 7, 1987.
Renewed for 12 months beginning April 8, 1986, at a stipend rate of \$27,200.

GONZALEZ-ALARCON, Walter (S): Peru; November 11, 1985-November 10, 1986.

*HALPERN, Leopold E. (S): Austria; April 16, 1986-April 15, 1987.
Ph.D. 1952, University of Vienna, Austria, Physics; \$50,000; "Search for Observable Effects predicted by Generalizations of the General Theory of Relativity."

HATAKEYAMA, Shiro (S): Japan, November 20, 1985-November 19, 1986.

HELLIGMAN, Gary M.: United States; September 5, 1984-September 4, 1986.

HERMAN, Gary A.: Australia; November 7, 1985-November 6, 1986.

HIGDON, James C. (S): United States; February 1, 1985-January 31, 1987.

*HOUGH, David H.: United States; April 1, 1986-March 31, 1987.
Ph.D. 1985, California Institute of Technology, Pasadena, Astronomy; \$26,350; "The Statistics of Relativistic Beaming in Extended Radio Quasars: VLBI and VLA Study of a Complete Sample."

ISRAELSSON, Ulf E.: Sweden; November 6, 1985-November 5, 1986.

JAMES, Geoffrey Kurt: United Kingdom; January 30, 1986-January 29, 1987.

JONES, Dayton L.: United States; July 30, 1984-July 29, 1986.

KRISHNAKUMAR, E.: India; May 2, 1985-May 1, 1987.
Renewed for 12 months beginning May 2, 1986, at a stipend rate of \$28,050.

LYELL, Margaret J.: United States; May 7, 1984-August 6, 1986.
Renewed for 3 months beginning May 7, 1986, at a stipend rate of \$33,100.

MAWHORTER, Richard J.: United States; June 13, 1985-June 12, 1986.

MAY, Randy Dean: United States; April 24, 1985-April 23, 1987.
Renewed for 12 months beginning April 24, 1986, at a stipend rate of \$27,200.

MAYNARD, Nancy G. (S): United States; September 3, 1985-September 2, 1986.

MCEWAN, Murray J. (S): New Zealand; November 25, 1985-November 24, 1986.

MCRAE, Glenn A.: Canada; January 23, 1985-January 22, 1987.

PAIGE, David A.: United States; August 8, 1985-August 7, 1986.

POLSTORFF, Juergen: West Germany; October 22, 1984-October 21, 1986.

POPE, Kevin O.: United States; December 3, 1985-December 2, 1986.

RAITALA, Jouko T.: Finland; April 29, 1985-April 28, 1987.

Renewed for 12 months beginning April 29, 1986, at a stipend rate of \$28,900.

RAMESHAM, Rajeshuni: India; October 31, 1985-October 30, 1986.

SALO, Joukp H.: Finland; December 2, 1985-December 1, 1986.

SHAMIR, Jacob (S): Israel; July 1, 1985-June 30, 1986.

SHARMA, Pramod K. (S): India; August 13, 1984-August 12, 1986.

STOLZ, John F.: United States; September 28, 1984-September 27, 1986.

TOON, Geoffrey C.: United Kingdom; June 11, 1984-June 10, 1986.

VOGELMANN, James E.: United States, November 6, 1984-November 5, 1986.

WENKERT, Daniel: United States; September 9, 1985-September 8, 1986.

WOODWARD, Martin: United States; July 2, 1985-July 1, 1986.

LANGLEY RESEARCH CENTER, Hampton, Virginia

ANDERSON, Iris Cofman: United States; September 12, 1984-September 11, 1986.

CRILL, Patrick M.: United States; September 12, 1984-September 11, 1986.

DAUDPOTA, Q. (S): Pakistan; June 10, 1985-June 9, 1986.

GHAEMMAGHAMI, Peiman: Iran; August 20, 1985-August 19, 1986.

HARTMAN, Jean M.: United States; December 3, 1984-December 2, 1986.

HARTWICH, Peter-Michael: West Germany; June 18, 1984-June 17, 1986.

*HUANG, Lein-Saing: United States; March 31, 1986-March 30, 1987.

Ph.D. 1985, University of Southern California, Los Angeles, Aerospace;
\$31,500; "The Effect of a Non-Zero Pressure Gradient on the Control of the
Boundary Layer Transition."

ISHII, Katsuya: Japan; September 16, 1985-September 15, 1986.

KISHONI, Doron: Israel; March 11, 1984-March 10, 1987.

Renewed for 12 months beginning March 10, 1986, at a stipend rate of \$33,200.

*KUMAR, Devendra (S): India; April 3, 1986-April 2, 1987.

Ph.D. 1977, Delhi University, India, Chemistry; \$37,000; "Tough, Enhanced Melt Processible, Fire and High Temperature Resistant Polyimide Matrix Resins Containing Substituted Phosphazene-Siloxene."

MILES, Thomas: United States; June 4, 1984-June 3, 1986.

MORTON, John (S): United Kingdom; January 6, 1986-October 5, 1986.

NAIDU, Desineni S. (S): India; January 11, 1985-January 10, 1987.

RAMANA, Munagala V.: India; January 2, 1985-January 1, 1987.

*REBSTOCK, Rainer: West Germany; May 23, 1986-May 22, 1987.

Ph.D. 1985, Technical University Berlin, FRG, Aeronautics; \$31,500; "The Use of Wind Tunnels With No Adaptive Walls for 3D-Model Tests."

REDDY, N. M. (S): India; October 15, 1985-October 14, 1986.

SANCHEZ-CAMPEROS, Edgar N.: Columbia; January 7, 1985-January 6, 1987.

SNYDER, Melvin H. (S): United States; August 1, 1985-July 31, 1986.

WILSON, John O.: United States; November 19, 1984-November 18, 1986.

WOLF, Stephen: United Kingdom; April 1, 1985-March 31, 1987.

Renewed for 12 months beginning April 1, 1986, at a stipend rate of \$33,200.

LEWIS RESEARCH CENTER, Cleveland, Ohio

BANSAL, Narottam P. (S): India; September 30, 1985-September 29, 1986.

CHAO, David F.: Taiwan; September 4, 1984-September 3, 1986.

CHEN, Chiun-Hsun: Taiwan; September 3, 1985-September 2, 1986.

CHOPRA, Mona A.: India; September 10, 1984-September 9, 1986.

HATTORI, Shuji: Japan; September 25, 1985-September 24, 1986.

HEBSUR, Mohan G.: India; January 16, 1984-July 15, 1987.

KATO, Kohji (S): Japan; August 26, 1985-August 25, 1986.

+LAI, Chun-Liang: Taiwan; June 19, 1984-August 31, 1986.
Split tenure from December 31, 1985 to March 17, 1986.

MANORY, Rafael R.: Israel; July 15, 1985-July 14, 1986.

NIR, Dan (S): Israel; August 1, 1984-July 31, 1986.

SARMA, Garimella (S): India; May 6, 1985-May 5, 1987.
Renewed for 12 months beginning May 6, 1986, at a stipend rate of \$41,818.

SIMONS, Rainee: Israel; August 8, 1985-August 7, 1986.

TEWARI, Surendra Nath (S): India; January 4, 1984-June 3, 1986.

VALISETTY, Ramakrishna: India; May 1, 1985-June 30, 1986.
Renewed for 2 months beginning May 1, 1986 at a stipend rate of \$32,350.

LYNDON B. JOHNSON SPACE CENTER, Houston, Texas

CARR, Robert H.: United Kingdom; October 1, 1985-September 30, 1986.

COHLY, Hari H. P.: Canada; February 3, 1986-February 2, 1987.

COHN, Judith D.: United States; September 4, 1984-September 3, 1986.

COLSON, Rossell O.: United States; February 24, 1986-February 23, 1987.

DASCH, E. Julius (S): United States; September 2, 1985-September 1, 1986.

HOWERTON, Thomas C.: United States; March 1, 1985-February 28, 1987
Renewed for 12 months beginning February 28, 1986, at a stipend rate of \$28,050.
Please note that Dr. Howerton was reported as terminated in our last report #86.

KALMAZ, Ekrem Erroll (S): United States; April 2, 1984-October 1, 1986.
Renewed for 6 months beginning April 2, 1986, at a stipend rate of \$32,500.

MING, Douglas W.: United States; January 6, 1986-January 5, 1987.

MITTLEFEHLDT, David W. (S): United States; September 23, 1985-September 22, 1986.

*MORGAN, Thomas H. (S): United States; May 12, 1986-May 11, 1987.
Ph.D. 1972, University of Florida, Physics; \$41,000; "The Atmosphere of Mercury."

MURALI, Ahobila V. (S): India; June 18, 1984-June 17, 1986.

SAMS, Clarence F.: United States; October 1, 1984-September 30, 1986.

MARSHALL SPACE FLIGHT CENTER, Huntsville, Alabama

AN, Chang-Hyuk: Korea; October 15, 1984-October 14, 1986.

CHEN, Chien-Pin: Taiwan; October 1, 1984-September 30, 1986.

HWANG, Kai-Shen: Taiwan; January 7, 1985-January 6, 1987.

MACHADO, Marcos E. (S): Argentina; August 5, 1985-August 4, 1986.

MIYAJI, Shigeki: Japan; September 3, 1985-September 2, 1986.

PORTER, Jason G.: United States; June 18, 1984-June 17, 1986.

PUSEY, Marc Lee: United States; March 1, 1984-February 28, 1987.

Renewed for 12 months beginning March 1, 1986, at a stipend rate of \$29,750.

REINLEITNER, Lee A.: United States; June 7, 1984-June 6, 1986.

NASA HEADQUARTERS, Washington, D. C. (Research Management Associateship Program)

SYLVESTER, Paul J.: United States; March 26, 1984-March 25, 1987.

Renewed for 12 months beginning March 25, 1986, at a stipend rate of \$28,050.

Dr. Sylvester transferred from Johnson Space Center NASA Headquarters to terminate his tenure.

PART II

ASSOCIATES WHO TERMINATED DURING THIS PERIOD

March 1, 1986, through May 31, 1986

AMES RESEARCH CENTER, Moffett Field, California

CHOATE, Glenda Louise (S): United States; October 3, 1983-April 2, 1986.

Adviser: Dr. Stan Ellis

Termination Report overdue; Adviser Evaluation overdue

+JORGENSEN, Bo B. (S): Denmark; September 1, 1984-April 2, 1986.

Return to terminate his research on January 3, 1986 for 3 months.

(Dr. Jorgensen was reported terminated in our Status Report No. 84)

Adviser: Dr. David J. Des Marais

Termination Report overdue; Adviser Evaluation received

LIU, Yen: Taiwan; May 1, 1984-April 30, 1986.

Adviser: Dr. Howard Lomax

Termination Report received; Adviser Evaluation overdue

WEDEKING, Kim Winfred: United States; September 6, 1983-March 5, 1985.

Adviser: Dr. Sherwood Chang

Termination Report received; Adviser Evaluation received

GODDARD INSTITUTE FOR SPACE STUDIES, New York, NY

VRTILEK, Jan Mojmir: United States; January 3, 1984-April 2, 1986.

Adviser: Dr. Patrick Thaddeus

Termination Report received; Adviser Evaluation overdue

GODDARD SPACE FLIGHT CENTER, Greenbelt, Maryland

KAUFL, Hans U.: Germany; January 18, 1985-January 17, 1987.

Adviser: Dr. M. J. Mumma

Termination Report overdue; Adviser Evaluation overdue

LANDSMAN, Wayne: United States; March 2, 1984-March 1, 1986.

Adviser: Dr. T. P. Stecher

Termination Report received; Adviser Evaluation overdue

MALINGREAU, Jean-Paul: Belgium; April 24, 1984-April 23, 1986.

Adviser: Dr. C. J. Tucker

Termination Report received; Adviser Evaluation received

NEWMAN, Paul A.: United States; July 23, 1984-July 22, 1986.

Adviser: Dr. Mark Schoeberl

Termination Report overdue; Adviser Evaluation received

SCHWALLER, Mathew R., United States; February 28, 1984-December 31, 1985.

Went on leave without pay for January and February 1986, but never came back on tenure.

Adviser: Dr. P. D. Lowman

Termination Report overdue; Adviser Evaluation overdue

JET PROPULSION LABORATORY, Pasadena, California

LAWTON, Teri Ann: United States; April 27, 1984-April 26, 1986.

Adviser: Dr. John D. Hestenes

Termination Report received; Adviser Evaluation overdue

SCHWARTZ, Richard A.: United States; April 23, 1984-April 22, 1986.

Adviser: Dr. A. S. Jacobson

Termination Report overdue; Adviser Evaluation overdue

LANGLEY RESEARCH CENTER, Hampton, Virginia

KUBENDRAN, Laguduva R.: India; March 15, 1984-March 14, 1986.

Adviser: Dr. W. D. Harvey

Termination Report overdue; Adviser Evaluation received

LEWIS RESEARCH CENTER, Cleveland, Ohio

JOHNSTON, James C.: United States; September 4, 1984-March 31, 1986.

Adviser: Dr. H. H. Grimes

Termination Report received; Adviser Evaluation received

LYNDON B. JOHNSON SPACE CENTER, Houston, Texas

SYLVESTER, Paul J.: United States; March 26, 1984-March 25, 1986.

Adviser: William C. Phinney

Termination Report received; Adviser Evaluation overdue

Dr. Sylvester transferred to NASA Headquarters.

MARSHALL SPACE FLIGHT CENTER, Huntsville, Alabama

None this reporting period

NASA HEADQUARTERS, Washington, D. C. (Research Management Associateship Program)

None this reporting period

PART III

Overdue Reports Received this Quarter

AMES RESEARCH CENTER

Ken-ichi Nasu

GODDARD SPACE FLIGHT CENTER

None this reporting period

JET PROPULSION LABORATORY

None this reporting period

LANGLEY RESEARCH CENTER

None this reporting period

LEWIS RESEARCH CENTER

None this reporting period

MARSHALL SPACE FLIGHT CENTER

None this reporting period

JOHNSON SPACE FLIGHT CENTER

None this reporting period

Part IV

PROGRESS REPORTS

Associates are required to submit a short Progress Report after 6 months of tenure. The following is a list of Reports received this quarter:

AMES RESEARCH CENTER

Grunwald, Arthur J.
Kanki, Barbara G.
Kawamura, Tetuya
Lee, Duck-Joo
Lee, Moon Joo
Palmisano, Anna C.
Pettersson, Lars
Stoker, Carol
Westman, Walter E.

GODDARD INSTITUTE FOR SPACE STUDIES

None this reporting period

GODDARD SPACE FLIGHT CENTER

Buergi, Alfred
Leisawitz, David
Maezawa, Kiyoshi
Mitchell, Kenneth J.
Schaefer, Robert K.
Venkatesh, Y. V.
Zuber, Maria T.

JET PROPULSION LABORATORY

Berthias, Jean-Paul
Gonzalez, Walter
Hatakeyama, Shiro
Herman, Gary
Israelsson, Ulf E.
Maynard, Nancy Gray
McEwan, Murray J.
Ramesham, Rajeshuni
Woodard, Martin F.

LANGLEY RESEARCH CENTER

Ishii, Katsuya
Reddy, N. M.

LEWIS RESEARCH CENTER

Bansal, Narottam P.
Chen, Chiun-Hsun
Hattori, Shuji

LYNDON JOHNSON SPACE CENTER

Carr, Robert H.
Wittlefehldt, David W.

MARSHALL SPACE FLIGHT CENTER

None this reporting period

NASA HEADQUARTERS

None this reporting period

AMES RESEARCH CENTER

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TERMINATION REPORT

ASSOCIATESHIP
OFFICE

Apr. 30, 1986

Name : Yen Liu

Place of Tenure : CFD branch, NASA Ames Research Center

Dates of Tenure : May 1, 1984 - Apr. 30, 1986

Research Adviser : Harvard Lomax

Travel :

1. SIAM Summer Meeting, Seattle, WA., July 16-20, 1984.
2. AIAA 23rd Aerospace Sciences Meeting, Reno, NV., Jan. 14-17, 1985.
3. AIAA 7th CFD Conference, Cincinnati, Ohio, July 14-18, 1985
4. AIAA 24th Aerospace Sciences Meeting, Reno, NV., Jan. 5-9 1986.

Publications :

1. *The Mechanisms of Determining Shock Locations in One and Two Dimensional Transonic Flows*, J. of Applied Mechanics, Vol. 53, No. 1, 1986 (with D. Nixon).
2. *A Numerical Study of Shock Wave Diffraction by a Circular Cylinder*, AIAA paper 86-0272, Jan. 1986, (with J.Y. Yang and H. Lomax).
3. *Nondissipative Steady-State Solutions for the Euler Equations*, AIAA paper 85-1498-C.P. July, 1985, (with H. Lomax).

Summary of Research :

1. Developed nonstationary relaxation techniques based on eigenvector annihilation for system of partial differential equations with emphasis on fluid dynamics.
2. Developed numerical boundary conditions which exploit the two-family structure of central differencing, leading to nondissipative solutions to the Euler equations.

NATIONAL RESEARCH COUNCIL

--RESEARCH ASSOCIATESHIP PROGRAM

APR 19 1986

Name: Kim Winfred Wedeking Date: 4/22/86

Place of tenure: Ames Research Center Dates of Tenure: 9/1/83-
3/5/86

Research Adviser: Sherwood Chang

Not on Leave From a Professional Post.

No International Posts Held During Tenure.

Travel on Tenure: None

Teaching as an Associate: None

Publications: Lunar and Planetary Science Abstracts XVI.

No Patents Applied For.

Work in Progress: None

Future Position and Address: Unknown R.R.1 Box 257 Okawville, IL.
62271

Summary of Research During Associateship: Partially built, trouble-shot, and calibrated a GC-combustion system for the separation, identification, and isotopic analysis of methane, ethane, ethylene, propane, propylene, butane, butylene, CO₂, and CO. Laid the qualitative groundwork for a quantitative study of the isotopic dynamics of the Fischer-Tropsch reaction.

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TERMINATION REPORT

MAR 6 1986

Research Associate Program

ASSOCIATESHIP
OFFICE

Date: March 3, 1986

Associate: Wayne Landsman

Advisor: T.P. Stecher

Place of Tenure: NASA/Goddard Space Flight Center

Dates of Tenure: 3-2-84 to 3-1-86

Travel on Tenure (Scientific Meetings):

- (1) I.A.U. Colloquium No. 81, The Local Interstellar Medium
Madison WI; 6-3-84 to 6-7-84
- (2) Working Group on Science from the Astro Mission
Charlottesville, VA;
- (3) American Astronomical Society Meeting:
Tucson, AZ; 1-14-85 to 1-18-85.
- (4) American Astronomical Society Meeting:
Charlottesville, VA; 6-3-85 to 6-7-85.

Publications resulting from research as an Associate

- (1) "IUE Observations of Interstellar HI Toward Nearby Late-Type Stars", W.B. Landsman, R.C. Henry, H.W. Moos, and J.L. Linsky, in Proceeding of I.A.U. Colloquium No. 81 on the Local Interstellar Medium, p. 60
- (2) "IUE Observations of Interstellar Hydrogen and Deuterium toward Alpha Centaurus B", W.B. Landsman, J. Murthy, R.C. Henry, H.W. Moos, J.L. Linsky and J.L. Russell, to be published in the Astrophysical Journal, (April 15, 1986).

Work in Progress

A paper is being prepared containing a catalog of UV fluxes of HII regions in M33.

Summary of Research

I continued an IUE program to observe hydrogen and deuterium in the local interstellar medium. By observing identical interstellar profiles toward both α Cen A and α Cen B, I demonstrated that the profiles were free from chromospheric contamination. Small-aperture, high-dispersion spectra were also obtained of Procyon, Altair, ϵ Eri, and HR1099.

A study of rocket far-ultraviolet images of M33 showed the predominance of HII regions in the far ultraviolet. Surface photometry of the galaxy showed that the distribution of the UV

bright populations does not differ significantly from that in the visible.

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ASSOCIATESHIA
OFFICE

TERMINATION REPORT

Jean-Paul Malingreau

Research Associate, National Research Council

NASA Goddard Space Flight Center

April 24. 1983 - April 23. 1985

Research Adviser : Dr. C.J Tucker

1. Travel, presentations and seminars during tenure

- . NASA/GISS, New-York. June 20.1984. Seminar on Borneo forest fires.
- . Harvard University, Center for International Studies. Cambridge Mass. Nov.20.1984. Presentation on impacts of forest fires in Kalimantan and Borneo 1982-83.
- . Woodshole, Center for Ecosystem Studies. Nov.21.1984. Satellite remote sensing and global vegetation monitoring.
- . ERIM Int. Symposium on Remote Sensing of the Environment. Oct.1984 Paris, France. invited presentation on Remote Sensing for Disaster Monitoring.
- . The East West Center , Hawaii. Feb.4-7.1985. Workshop on Ecological baseline establishment and monitoring.
- . Columbia University, New-York. March 4. 1985. Global Habitability Workshop. Presentation on Global vegetation monitoring.
- . World Resources Institute. Washington, D.C. April 15.1985. Presentation on Global Vegetation Monitoring.
- . U.N Committee on Outer Space Affairs. New-York.
- . Brazil, March 13-19.1986. visit to the Brazilian Space Agency. Presentation of current research on tropical deforestation. Visit to Amazon Basin colonization projects (Manaus and Rondonia).

2. Publications

- . Malingreau, J.P. 1985. Monitoring tropical wetland rice production systems. A test for orbital remote sensing. in: Remote Sensing and Tropical Land Management. M.J. Eden, Ed. Wiley's.
- . Malingreau, J.P. and Kaswanda. 1986. Monitoring volcanic eruptions in Indonesia using weather satellite data: the Colo eruption of July 28.1983. Int. J. of Volc. and Geoth. Res. 27:179-194.
- . Malingreau, J.P., G. Stephens and L. Fellows, 1985. Remote sensing of forest fires: Kalimantan and North Borneo in 1982-83. 1985. Ambio, 14(6): 314-321.
- . Malingreau, J.P. Global vegetation dynamics: satellite observations over Asia. 1986. Int. J. of Remote Sensing (in press).
- . Malingreau, J.P and C.J. Tucker. 1986. Satellites et dynamique globale de la végétation. 1986. La Recherche. Paris. (submitted)
- . Malingreau, J.P. 1986. The 1982-83 drought in Indonesia: assessment and monitoring. in: UNEP/NCAR/WMO Report on Economic and Societal Impacts Associate with the 1982-83 Climatic anomalies (in press).
- . Justice, C.J., J.P. Malingreau and J.U. Hielkema. 1984. The application of remote sensing techniques for monitoring natural vegetation, crops and rain rainfall. Proc. UN/FAO Workshop on Early

Warning Systems in Developing Countries in Asia and the Pacific Region. Bangkok.

3. Work in progress

Current research is dealing with tropical deforestation in the Amazon Basin. This work includes a study of the forest canopy dynamics using the NOAA- AVHRR 1982-85 satellite data. A new campaign of satellite data acquisition will be conducted in the coming months.

Continuing work is planned for analyzing the global vegetation data set over selected regions of Asia.

4. Future position

Consultant, Science Systems and Applications Inc., Code 623 NASA GSFC. (June 86).

Scientist, Div. of Physics, Joint Research Center. European Economic Community. Ispra (Varese). Italy (October 1986).

5. Summary of Research

The two years spent as a Research Associate at the Laboratory for Terrestrial Physics were mainly devoted to the analysis of satellite data for global vegetation studies. During the first year, attention was paid to the Asian continent where two specific topics were investigated. At first, a thorough investigation of the 1982-83 El Nino impact on the tropical forest of Kalimantan and Borneo was conducted. The research showed that early warning signs of the drought could be detected using the satellite derived vegetation index of the forest canopy. The progression of the catastrophic fires could also be monitored using the thermal channels on board the same satellite. The other aspect of the programme dealt with an analysis of the low resolution global vegetation index data for Asia; the study showed that this index is a reliable indicator of vegetation dynamics even over the much fragmented landscapes of agricultural regions of Asia.

The second year of tenure was devoted mainly to the organisation and analysis of a large NOAA-AVHRR data bank for studying tropical deforestation over the Amazon Basin. Preliminary results indicate that the approach yield unique information on the rapid changes taking place in the forest canopy of that tropical biome.

Various aspects of the research carried out during the two years of tenure have been presented in papers included in the list given above.

7. Acknowledgments

My deepest appreciation goes to Dr. C.J Tucker for having made this tenure a most fruitful and enjoyable experience. Thanks are also due to Dr. J. Soffen for his support and constant encouragements. The staff of the GIMMS project (NASA code 623) formed a most congenial, informal and enthusiastic group; it was a great pleasure to work with them. Finally, appreciation is expressed to the NRC and the staff of the Associateship Office for their help.

ASSOCIATESHIP TERMINATION REPORT

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ASSOCIATESHIP
OFFICE

Name of Associate: J. M. Vrtilek
Place of tenure: NASA Goddard Institute for Space Studies
Research Adviser: Dr. Patrick Thaddeus
Dates of tenure: 3 January 1984 to 31 March 1986

Travel on tenure:

National meetings --

- (1) January 13-16, 1985: 165th meeting of the American Astronomical Society in Tucson, Arizona.
- (2) June 3-7, 1985: 166th meeting of the American Astronomical Society in Charlottesville, Virginia.
- (3) October 3, 1985: Washington Area Astronomers Meeting in Columbia, Maryland, to give invited talk.

International meetings --

- (4) December 3-7, 1985: IAU Symposium No. 120 on Astrochemistry, in Goa, India.

Consultation --

- (5) July 18-20, 1984: visit to University of Chicago laser spectroscopy laboratory of Dr. T. Oka.

Publications from research as an Associate: please see attached list.

Summary of research during Associateship:

(1) In a program of laboratory and astronomical spectroscopy of reactive molecules of interstellar interest, the C_3H , C_2D , and C_3H_2 radicals were identified for the first time in space on the basis of millimeter-wave observations and in the laboratory following production in a glow discharge. C_3H_2 is of particular interest as the first interstellar organic ring molecule.

(2) To extend the sensitivity and frequency search capabilities of laboratory millimeter-wave spectrometers, a device incorporating a scanning Fabry-Perot cavity was developed to a sufficient extent to make clear the promise of this technique.

Future position and address:

Research Associate, University of Maryland
Code 697
NASA Goddard Space Flight Center
Greenbelt, MD 20771

J. M. Vrtilek
J. M. Vrtilek

31 March 1986

PUBLICATIONS DURING NRC ASSOCIATESHIP

1984 - 1986

J. M. Vrtilek

1. "Laboratory detection of the C_3H Radical," J. M. Vrtilek, C. A. Gottlieb, E.W. Gottlieb, and P. Thaddeus, Amer. Astron. Soc. Bull., 16, 877 (1984).
2. "Laboratory and Astronomical Identification of C_3H_2 ," J. M. Vrtilek, P. Thaddeus, and C. A. Gottlieb, Amer. Astron. Soc. Bull., 17, 568 (1985).
3. "Laboratory and Astronomical Detection of the Deuterated Ethynyl Radical CCD," C. A. Gottlieb, J. M. Vrtilek, P. Thaddeus, W. D. Langer, and R. W. Wilson, Amer. Astron. Soc. Bull., 17, 568 (1985).
4. "Laboratory detection of the C_3H radical," C. A. Gottlieb, J. M. Vrtilek, E. W. Gottlieb, P. Thaddeus, and A. Hjalmarsen, Astrophysical Journal Letters, 294, L55 (1985).
5. "Laboratory and astronomical detection of the deuterated ethynyl radical CCD," J. M. Vrtilek, C. A. Gottlieb, W. D. Langer, P. Thaddeus, and R. W. Wilson, Astrophysical Journal Letters, 296, L35 (1985).
6. "Laboratory and astronomical identification of cyclopropenylidene, C_3H_2 ," P. Thaddeus, J. M. Vrtilek, and C. A. Gottlieb, Astrophysical Journal Letters, 299, L63.
7. "The rotational spectrum of the C_3H radical," C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and J. M. Vrtilek (Astrophysical Journal, in press).
8. "Detection of cyclopropenylidene, C_3H_2 ," C. A. Gottlieb, P. Thaddeus, and J. Vrtilek (Proceedings of the 17th International Symposium on Free Radicals, Granby, Colorado, 1985, in press).
9. "Laboratory and Astronomical Spectroscopy of Hydrocarbon Radicals," J. M. Vrtilek, P. Thaddeus, and C. A. Gottlieb (Proceedings of IAU Symposium No. 120 on Astrochemistry, Goa, India, Dec. 1985, in press).
10. "The radio spectrum of cyclopropene," J. M. Vrtilek, C. A. Gottlieb, T. J. LePage, and P. Thaddeus (Astrophysical Journal, in press).
11. "Laboratory and astronomical spectroscopy of C_3H_2 , the first interstellar organic ring," to be submitted to the Astrophysical Journal.

JET PROPULSION LABORATORY

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April 27, 1984-April 26, 1986

APR 14 1986

Teri B. Lawton

Jet Propulsion Lab, Caltech, 4800 Oak Grove Dr., Pasadena, Ca. 91109.
Robotics and Teleoperators Research Group, (818) 354-4257 or 354-6508

RESEARCH OBJECTIVES

As several stimulus dimensions are systematically varied, derive from observers' data the algorithms used by the visual system to reconstruct a 3 dimensional perception from a 2 dimensional neural representation. These algorithms will be used to implement visual processing in robots. These algorithms will also be used to aid image recognition by the partially sighted.

SUMMARY OF RESEARCH 1984-1986

4/1984-4/1986 -- Resident Research Associate at Jet Propulsion Laboratory, Caltech, Pasadena, Calif. Research Advisor: John Hestenes, Ph.D. Conducted visual psychophysics research to investigate the algorithms used by the visual system to discriminate position and contrast differences between oriented edges as several stimulus dimensions were systematically varied. Presented research at scientific meetings. This research found that relative phase and spatial frequency differences contribute more to position discrimination than do motion and temporal frequency differences. As the contrast of the background was increased from 0-10% phase discrimination was not affected, indicating that phase discrimination operates at the center of its working range over a 5 octave range of contrasts. A quantitative model of discrimination performance in psychophysical tasks having perceptual and cognitive components was derived based on observers' data. Image enhancement to aid image recognition by the partially sighted was investigated by studying the image processing of low vision patients. Studies included task analysis, real-time interactive vision testing, signal and image processing, image enhancement, biophysics, neurophysiology, psychophysical measurement and modeling, pattern recognition, and performance evaluation of neural networks.

HONORS: Certificate of Recognition by NASA for the creative development of a technical innovation, 1985.

TRAVEL DURING RRA AT JPL

Attended Annual Meetings of ARVO in Sarasota, Florida, May 1986, 1985, and 1984 where research was presented by specific invitation in 1986.

Attended Annual Meeting of Noninvasive Assessment of the Visual System, sponsored by OSA and AAO in Monterey, Ca., March 1986.

Attended Low Vision Workshop at the Wilmer Eye Institute, Johns Hopkins University Hospital, Baltimore, Md, October 1985, by specific invitation, sponsored by NASA.

Visited Drs. Ted Adelson and Jim Bergen at RCA Labs in Princeton, N.J. and Drs. Eli Peli and Larry Arend at Eye Research Institute of the Retina Foundation in Boston, Ma. October 1985.

Attended Annual Meetings of OSA by specific invitation in Washington D.C., October 1985 and in San Diego, Calif. October 1984 where research done at JPL was presented.

Presented research to Neurobiology Department at Caltech, November, 1986.

Presented research to the School of Optometry at U.C. Berkeley and Smith Kettlewell Institute for Visual Sciences in San Francisco, Ca., June 1985 and at Institute of Visual Sciences at U. of Rochester, N.Y. November, 1985.

Presented research to Office of Naval Research, San Diego, Ca. July 1985.

Attended meeting of the Helmholtz Club at U.C. Irvine, May 1985.

Attended conference on neural network modeling at Miramar, Santa Barbara, Ca., May 1985.

Visited NASA Ames Research Center to discuss ultrasound procedures, November 1984.

Visited Drs. Lewis Harvey and Jack Werner at U. of Colorado, Boulder, October, November 1984, February, April 1985.

Attended Annual Meeting of the Society of Neurosciences in Anaheim, Ca. October 1984.

Attended by specific invitation the 7th European Conference on Visual Perception in Cambridge, Great Britain, September 1984 where research done at JPL was presented.

Attended by specific invitation the Workshop on Systems Approach in Vision at the Royal Netherlands Academy of Arts and Sciences in Amsterdam, The Netherlands, August 1984 where research done at JPL was presented.

PUBLICATIONS DURING RRA AT JPL

"Relative Phase Differences Contribute More To Position Discrimination Than Do Motion Differences", in preparation, 1986.

"Algorithms Used To Discriminate Position Differences of Oriented Edges on Multifrequency Backgrounds", in preparation, 1986.

"The Role of X and Simple Cells in the Contrast Transducer Function of Low Vision and Normal Observers", Presented at the International Symposium on Low Vision in Ontario, Canada, June 1986, in preparation.

"The Role of X and Simple Cells in the Contrast Transducer Function", Presented with Christopher Tyler at the Annual Meeting of ARVO in

Sarasota, Florida, May 1986, in preparation.

"The Importance of Human Vision in Machine Perception", JPL White Paper, 1986.

"Pattern Recognition in the Human Visual System", JPL White Paper, 1985.

"Directional Selectivity Used to Discriminate Spatial-Phase at Low and High Background Contrasts" Presented at the Annual Meeting of OSA in Washington D. C., October 1985.

"Investigations Into the Processes Used to Identify Positional Differences Between Pattern Components: A Literature Review", in preparation, presented to the School of Optometry at U.C. Berkeley and Smith Kettlewell Institute for Visual Sciences, June 1985 and at Institute of Visual Science at U. of Rochester, N.Y. November, 1985.

"Spatial Frequency Spectrum of Patterns Changes The Visibility Of Spatial-Phase Differences" J. Opt. Soc. Am. A. Feature Issue on Spatial Vision, 2: 1140-1152, 1985.

"Differences Between Pattern Frequencies Used When Discriminating Spatial-Phase", Presented at the Annual Meeting of the Optical Society in San Diego, California, November 1984, in preparation.

"Short Pattern Presentations Do Not Increase Contrast Thresholds When Discriminating Spatial-Phase Differences", Presented at the 7th European Conference on Visual Perception in Cambridge, Great Britain August 31 to September 1984.

"Differences Between Pattern Frequencies Used To Discriminate Spatial Phase", Presented at the Royal Netherlands Academy of Arts and Sciences in Amsterdam, The Netherlands, August 1984.

LEWIS RESEARCH CENTER

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NATIONAL RESEARCH COUNCIL
Research Associateship Program
Termination Report

MAR 31 1986

ASSOCIATESHIP

26 MAR 1986

Dr. James C. Johnston

NASA Lewis Research Center
Cleveland, Ohio

from Sept 3, 1984
to March 31, 1986

Advisors: T. T. Serafini
R. W. Lauver

No out of town travel during tenure

Attended:

Cleveland Section ACS meeting in miniature
April, 1985
March, 1986

Publications:

Mechanism of the imidization of polyimides.
Currently being prepared for publication.

No patents.

In process: Providing instrumental support for an isotopic
labeling study of the high temperature
degradation of polyimide polymers

Future position and address:

NASA Lewis Research Center
Microgravity Materials Science Laboratory
21000 Brookpark Road
Cleveland, Ohio 44135

Summary of research during associateship:

The mechanism of the imidization reaction that occurs between 3,3',4,4'-benzophenonetetracarboxylic acid dimethyl ester (BTDE) and 4,4'-methylenedianiline (MDA) was examined during the course of this project. The data that was gathered indicates the intermediacy of an anhydride. The ester-acid is converted to the corresponding anhydride which is attacked by the diamine to form an amide-acid. At normal reaction temperatures the closure of the amide-acid to imide is rapid. The data was collected through the use of a series of kinetic NMR experiments, supported by infrared spectroscopy and differential scanning calorimetry.

LYNDON JOHNSON SPACE CENTER

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NATIONAL RESEARCH COUNCIL
RESEARCH ASSOCIATESHIP PROGRAM

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Dr. Paul J. Sylvester
NASA/Johnson Space Center
March 25, 1984 - March 25, 1986
Research adviser: Dr. William C. Phinney

May 12, 1986

Travel/Meetings/Seminars on tenure:

May 1984 Wawa, Ontario, Canada
Field mapping and sample collection. Consultation with Mr. Ron Sage,
Ontario Geological Survey

March 1985 Houston, Texas
Presentation at the Lunar and Planetary Science Conference

May 1985 Fredericton, New Brunswick, Canada
Presentation at the Geologic Association of Canada - Mineralogic
Association of Canada Joint Annual Meeting

June 1985 Mississauga, Ontario, Canada
Presentation at the International Conference on mafic dyke swarms

June - July 1985 Southwest Greenland
Sample collection for Dr. Paul Morgan, Purdue University and
attendance at Field Workshop on The World's Oldest Rocks sponsored by
the Lunar and Planetary Institute

August 1985 Wind River Range, Wyoming
Presentation at the Archean Geochemistry Field Conference

September 1985 Houston, Texas
Seminar at the Lunar and Planetary Institute

October 1985 Orlando, Florida
Presentation at the Annual Meeting of the Geological Society of
America

January 1986 Houston, Texas
Presentation at the Workshop on the Tectonic Evolution of Greenstone
Belts sponsored by the Lunar and Planetary Institute

March 1986 Houston, Texas
Presentation at the Lunar and Planetary Science Conference

Publications and papers on tenure:

1985. (with K. Attoh and K.J. Schulz) Origin of HREE-depleted Archean dacites: A case study from the Wawa (Michipicoten) greenstone belt, Ontario: Lunar and Planetary Science XVI, p. 835-836.
1985. (with K. Attoh and K.J. Schulz) Geochemical variations within the lower volcanic cycle of the Archean Wawa greenstone belt, Ontario: Geol. Assoc. Canada Abstr. with Programs, v. 10, p. A60.
1985. (with K.J. Schulz) Petrogenesis and tectonic significance of Proterozoic mafic dikes, St. Francois Mountains, Missouri, USA: International Mafic Dyke Swarm Conference Proceedings (H. Halls, ed.), p. 173-179. University of Toronto, Mississauga, Ontario.
1985. Tectonic significance of bimodal volcanism in the Archean Michipicoten greenstone belt, Ontario: Geol. Soc. Am. Abstr. with Programs, v. 17, n. 7, p. 731.
1986. (with K. Attoh and K.J. Schulz) Melting of mafic and felsic sources to produce the HREE-depleted dacites of the Michipicoten greenstone belt, Ontario: Lunar and Planetary Science XVII (in press).
1986. (with K. Attoh and K.J. Schulz) Rhyolitic components of the Michipicoten greenstone belt, Ontario: Evidence for late Archean intracontinental rifts or convergent plate margins in the Canadian Shield? In Workshop on the Tectonic Evolution of Greenstone Belts (M.J. de Wit and L.D. Ashwal, eds.), p. xx-xx, LPI Tech. Rpt. 86-xx, Lunar and Planetary Institute, Houston (in press).
1986. (with K. Attoh and K.J. Schulz) Tectonic setting of late Archean bimodal volcanism in the Michipicoten (Wawa) greenstone belt, Ontario: Earth and Planetary Science Letters (submitted).
1986. (with K. Attoh and K.J. Schulz) Did anatexis in the Kapuskasing structural zone produce the HREE-depleted dacites of the Michipicoten greenstone belt? Geol. Assoc. Canada Abstr. with Programs (in press).

Summary of research during Associateship:

Two well-exposed late Archean granitoid intrusions, the Jubilee and Gutcher Lake stocks of the Michipicoten (Wawa) greenstone belt, Ontario were mapped (in part at 1 inch = 200 feet) and sampled in detail. Modal abundance data and whole rock major and trace element compositions were determined for thirty-five Jubilee samples and twenty Gutcher Lake samples. Major element mineral compositions and zoning patterns for plagioclase, biotite, ilmenite and magnetite were determined from selected samples. Trace element compositions of the same minerals and apatite, epidote and zircon were documented for one Jubilee sample. These data suggest that both stocks formed by in situ closed system crystallization, but that the more mafic, high-temperature Jubilee stock melted and mixed with its wall-rock, leaving minimum-melt rhyolites at its margins.

Work in progress:

The model described above for the crystallization history of the two stocks is being quantified using mathematical expressions for closed system fractional crystallization and wall-rock melting. Intensive parameters such as temperature and oxygen fugacity are being calculated from the mineral data. Trace element partition coefficients appropriate for Archean tonalite are being determined from the mineral and whole rock trace element data. Possible source materials are being evaluated for the most primitive samples in the stocks. The chemical evolution of the melts in the stocks is being compared to the chemical evolution of the co-magmatic volcanics of the Michipicoten belt.

Current Position: National Research Council
Research Management Associate
NASA Headquarters (Code EL)
Washington, DC 20546
202/453-1616

OVERDUE REPORTS

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ASSOCIATESHIP
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Termination Report

Date: March 15, 1986

Name: Ken-ichi Nasu

Place of tenure: NASA Ames Research Center, Rotary Wing Aeromechanics Branch

Period: March 1, 1984 to February 28, 1986

Research Adviser: D.G. Koenig

On leave from: N/A

International post held during tenure: N/A

Travel on tenure:

1. Symposium on Advances and Trends in Structures and Dynamics, Washington, D.C., October 22-25, 1984
2. American Helicopter Society 41st Annual Forum and Technology Display, Fort Worth, Texas, May 15-17, 1985

Publication: "A Study on Tilt-Rotor Flutter Control in Cruising", NASA TM, under process of review

Work in progress:

1. Study on the synthesis of selecting the feedback gain
2. Study on the differences between the results given under various assumptions in tilt-rotor aerodynamics

Future address: c/o Takeo Iwata, 4-31-5 Chuo Nakano-ku, Tokyo Japan

104-86

Summary of research:

A method for the determination of flutter control law employing the lowest natural modes for each degrees of freedom has been examined using harmonic method. Tilt-rotor model used there consists of cantilever wing which has two bending and one torsional degrees of freedom, pylon attached to wing tip and three cantilever rotor blades each of which has two bending degree of freedom. The eigenvalue analysis showed that cyclic pitch control using wing tip deformation as an input can stabilize the system. In order to evaluate and confirm the effect of control given in this way, a method of time-wise calculation has been developed. The local circulation method was chosen as an aerodynamic tool to calculate blade airloading, and the extended lifting line theory to calculate wing airloading. Those have been modified to include unsteady effect and equations of motion for tilt-rotor aircraft consisting of wing, pylon and rotor blades. It has been confirmed that the stability of tilt-rotor motion is improved using cyclic pitch control given above.

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 4/4/86

Associate Name: Arthur J. Grunwald

Laboratory: Ames Research Center MS 239-3

Location: Moffet Field, Ca, 94035

Starting Date of Tenure 9.2.85

Adviser Name: Dr. S.R. Ellis

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|----------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>✓</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>—</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>✓</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>✓</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>✓</u> | <u>—</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>—</u> | <u>—</u> |

Comments:

The Associateship Office has been handling all administrative affairs promptly, correctly and efficiently.

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Is the space assigned reasonably adequate?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are you able to participate in local seminars, colloquia, etc.?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

I plan to present my achievements until now at the VI European Annual Conference on Manual Control at Cardiff, Oh in a paper entitled "Spatial Cancellation by Familiarity Cues".

Brief resume of progress:

Satisfactory progress has been made with the formulation of Mathematical Models for Spatial Perception. These models will be used in the development of the Proximity Operations Displays used in the Space Station. The display products have been outlined and I have recently started their implementation on the graphics computer. Although my progress is satisfactory, the graphics computer used for the implementation, arrived only last month, which introduced an unexpected delay. I therefore intend to request extension of my tenure to an additional year.

I am really happy with the program; It provides an excellent opportunity for researchers to spend their Sabbatical with overseas colleagues, to learn and explore new fields of interest and to establish a fruitful cooperation in this field.

Suggestions:

I would appreciate if you could:

- (1). Continue exploring the possibility for a Dental Plan for NRC Associates
- (2) Help solve the "never solved" problem of The Foreign National's IRS Status.

Art. Grunwald

CT/Kanki/DC

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: April 11, 1986

Associate Name: Barbara G. Kanki

Laboratory: NASA - Ames Research Center

Location: Moffett Field, CA 94035

Starting Date of Tenure October 21, 1985

Adviser Name: Dr. H. Clayton Foushee

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ASSOCIATESHIP
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I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	<u> </u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	<u> </u>
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	<u> </u>
4. Is the stipend being received regularly in a timely way?	<u>X</u>	<u> </u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	<u> </u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	<u> </u>

Comments:

over...

2/5/85

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II. Laboratory functions

Yes No

- | | | |
|---|-------------|-------------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>X</u> | <u> </u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>X</u> | <u> </u> |
| 3. Is the space assigned reasonably adequate? | <u>X</u> | <u> </u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>X</u> | <u> </u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>X</u> | <u> </u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>X</u> | <u> </u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>X</u> | <u> </u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u> </u> | <u>X</u> |

Comments:

Brief resume of progress: Because my search is exploratory in nature, a significant period of time is devoted to developing a transcription/coding scheme which will distinguish good from poor simulator flight performances (i.e., testing out many variable definitions on a subset of transcripts before a final system is applied to the entire set). At the present time, I am closely examining 6 transcripts (continue below) *

General impression of program to date: The NRC program has proven to be an excellent vehicle of placement for me. The match between my research skills and interest with the work I am doing could not be more perfect. Although I am a newcomer to the field of aerospace, I find the substantive area both challenging and exciting and I am doing exactly the kind ~~of~~ of work that I have wanted to do.

Suggestions: I can only suggest that the program continue and expand.

* continued from above: (of the total 20) which have been coded (subject to change) and entered into the computer. On the basis of several emergent behavioral patterns I feel that I am making good progress at this stage of variable/coding development.

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APR 22 1986

SIX-MONTH PROGRESS REPORT

ASSOCIATESHIP
OFFICE

Date: April 17 , 1986

Associate Name: Tetuya Kawamura

Laboratory: NASA Ames Research Center

Location: Moffett Field, CA 94035

Starting Date of Tenure
October 24 , 1985

Adviser Name:

Dr. Wei J. Chyu

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>*</u>	<u>—</u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>—</u>	<u>—</u>
(Not requested)		
3. If requested, was the stipend advance available when you began tenure?	<u>*</u>	<u>—</u>
4. Is the stipend being received regularly in a timely way?	<u>*</u>	<u>—</u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>*</u>	<u>—</u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>*</u>	<u>—</u>

Comments: I am satisfied with associateship office functions.
Especially I appreciate for their help about income tax treatment.

over...

2/5/85

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>*</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>*</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>*</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>—</u>	<u>*</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>*</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>*</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>*</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>*</u>

Comments: I think NASA Ames is the very good place for my research, because it has the excellent staff and nice equipments(computers) and I can be engrossed in my research without worrying about the computer cost and without being interrupted by routine duties.

Brief resume of progress: At first, I was given some flow research (computer) code which was not complete at that time. By debugging it, I understood it perfectly and made it work with my adviser. Then in order to make the code more powerful and applicable one, I modified the large part of the code. The idea included in the modification and the results obtained by the new code were presented at our annual (aerodynamics) division review and will be submitted to some suitable scientific meetings.

General impression of program to date:

My assignment given by my adviser is very important from both a theoretical and a practical point of view and it is my pleasure to contribute to solving the problem. Although it is not easy, I think I will be able to accomplish my assignment with my adviser's appropriate assistance.

Suggestions: I think it is very important for NRC associates to attend the suitable scientific meetings. Unfortunately, the total amount of traveling expenses sometimes exceeds \$1500 per year. Therefore, if possible, the funds for traveling per one person should be increased according to circumstance.

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

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ASSOCIATESHIP
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SIX-MONTH PROGRESS REPORT

Date: 3/9/86

Associate Name: Duck-Joo Lee

Laboratory: NASA Ames

Location: Mottet field, Mountain View, Ca

Starting Date of Tenure 8/20/85

Adviser Name: Dr. Chuck Smith

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>✓</u>	<u>—</u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	<u>—</u>
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	<u>—</u>
4. Is the stipend being received regularly in a timely way?	<u>✓</u>	<u>—</u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>✓</u>	<u>—</u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>✓</u>	<u>—</u>

Comments:

None

over...

2/5/85

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>✓</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>✓</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>✓</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>•</u>	<u>✓</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>✓</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>✓</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>✓</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>✓</u>

Comments:

None

Brief resume of progress:

To simulate Blade-Vortex-Interaction numerically, a combined vortex and panel method is being developed. Followings are the main highlights of progress to date

- Adaptive Panel Generation on an airfoil surface for a steady or unsteady vertical flow
- Numerical visualization of streamlines for the flow.

General impression of program to date:

✓ The program is excellent, especially the research environment and facilities of this center. They are the best for my research area. However, I feel the pressure because of the time limit of the associate ship

Suggestions:

None

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: May 25, 1986
Associate Name: Moon Joo Lee
Laboratory: NASA-Ames Research Center
Location: Moffett Field, California
Starting Date of Tenure: November 25, 1985
Adviser Name: Dr. John Kim

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	—
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	N/A	—
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	—
4. Is the stipend being received regularly in a timely way?	<u>X</u>	—
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	N/A	—
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	—

Comments:

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MAY 6 1986

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

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SIX-MONTH PROGRESS REPORT

Date: April 28, 1986

Associate Name: Anna C. Palmisano

Laboratory: NASA-Ames Research Center

Location: Moffett Field, California

Starting Date of Tenure November 4, 1986

Adviser Name: Dr. David DesMarais

I. Associateship Office Functions

Yes No

- | | | |
|---|-------------|------------------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | <u> </u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>X</u> | <u> </u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u> </u> | <u> </u> |
| 4. Is the stipend being received regularly in a timely way? | <u> </u> | <u>sometimes</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?
I am still trying to get reimbursed for a trip in January. | <u> </u> | <u>X</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | <u> </u> |

Comments:

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started? The ordering system here is very slow.	<u> X </u>	<u> </u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u> X </u>	<u> </u>
3. Is the space assigned reasonably adequate?	<u> X </u>	<u> </u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u> </u>	<u> X </u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u> X </u>	<u> </u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u> X </u>	<u> </u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u> X </u>	<u> </u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u> </u>	<u> X </u>

Comments:

The system to order materials and supplies at NASA is very sluggish, therefore, getting set up for my project took longer than I anticipated.

Brief resume of progress:

At present, I am very satisfied with my progress on my project: Lamination in Modern Stromatolites. I have set up a system of high performance liquid chromatography to examine in detail the pigments that are found in the microbial components of these modern stromatolites. My study will provide information concerning both the structure and the function of these mat ecosystems.

General impression of program to date:

I have been very favorably impressed with the NRC program in general and the NASA-NRC program in particular. My research advisor, Dr. DesMarais, has been very generous in providing me with support and expertise for the successful completion of my project.

Suggestions:

My major problem has been 1) getting paid on time and 2) getting reimbursed for travel expenses incurred in collecting samples for my research.

NATIONAL RESEARCH COUNCIL
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SIX-MONTH PROGRESS REPORT

Date: March 17, 1986
Associate Name: Lars Pettersson
Laboratory: NASA/Ames Research Center
Location: Moffett Field, Ca 94035
Starting Date of Tenure September ²³~~20~~, 1985
Adviser Name: Dr Charles Bauschlicher

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MAR 21 1986

ASSOCIATESHIP
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I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	✓ ^(*)	—
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	✓	—
3. If requested, was the stipend advance available when you began tenure?	✓	—
4. Is the stipend being received regularly in a timely way?	✓	—
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	—	—
6. Are your questions to this Office being handled courteously and efficiently?	✓	—

Comments:

(*) Pre-start instructions arrived late in my case causing some problems related to relocation. However, this was entirely due to circumstances around my termination of previous engagement and return to my home country (Sweden).

I am very happy with the treatment I have received over... from the Office personnel.

2/5/85

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>✓</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>✓</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>✓</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>—</u>	<u>✓</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>✓</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>✓</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>✓</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>✓</u>

Comments:

Outstanding resources and a very exciting, professional research group to work in. ✓

Brief resume of progress: See enclosed summary.

General impression of program to date: Excellent!

Suggestions:

**Summary of work performed as NRC Associate
September 20, 1985 - March 20, 1986.**

Lars G.M. Pettersson
NASA Ames Research Center
RTC 230-3
Moffett Field, Ca 94035

I. Completed projects.

- Ia. L.G.M. Pettersson and P.E.M. Siegbahn, "Accurate Effective Core Potential for Germanium. Application to the Singlet-Triplet Splitting in GeH_2 .", Chem. Phys., in press.

Abstract

An accurate effective core potential (ECP) description, including frozen 3s,3p and a single-zeta contracted 3d orbital, has been developed for germanium. The ECP is tested against the corresponding all-electron description of the atom and also for geometry and excitation energies of GeH_2 with excellent results; at the SCF, CASSCF and CI levels the maximum difference from the all-electron results is 0.5 kcal/mol in the 1A_1 - 3B_1 excitation energy. Finally, the ECP description is used with an extended basis set and a high level of correlation to compute the singlet-triplet separation; the final CI results including the Davidson correction is 22.5 kcal/mol.

- Ib. L.G.M. Pettersson, C.W. Bauschlicher and I. Hussla, "Vibrations of Ammonia on the Cu(100) Surface", J. Vac. Science and Technology A, in press.
Extended abstract presented at the American Vacuum Society meeting in Houston, Texas, October 1985.

The totally symmetric vibration frequencies were calculated for NH_3 and

NH₃/Cu(100) where the Cu(100) surface was represented by a three-layered Cu₁₄ cluster. The central Cu atom was described with all its electrons while for the remaining cluster atoms only the valence 4s electrons were included in the calculations. The shifts in the vibrational frequencies show good agreement with experiment with the symmetric bend shifted by about 150 cm⁻¹ while the symmetric stretch is unaffected. In addition the dipole derivatives for the different motions are computed, but are shown not to be sufficiently affected by the adsorption on the surface to explain the large increase in the photoionization efficiency observed experimentally on the Cu(100) surface.

Ic. L.G.M. Pettersson and S.R. Langhoff, "Theoretical Electric Dipole Moments of SiH, GeH and SnH", Chem. Phys. Letters, in press.

Abstract

Accurate theoretical dipole moments (μ_e) have been computed for the X²Π ground states of Si⁻H⁺ (0.118 D), Ge⁺H⁻ (0.085 D) and Sn⁺H⁻ (0.357 D). The trend down the periodic table is regular and follows that expected from the electronegativities of the Group IV atoms. The recently derived [1] dipole moment of 1.24 ± 0.1 D for GeH from the relative intensities of electric and magnetic dipole transitions in the 10 μm spectrum of the X²Π state is seriously questioned.

Id. L.G.M. Pettersson, S.R. Langhoff and D. Chong, "Theoretical Study of the Electric Dipole Moment Function of the ClO Molecule", to be published.

Abstract

The potential energy function and electric dipole moment function (EDMF) are computed for ClO X²Π using several different techniques to include electron correlation. The EDMF is used to compute Einstein coefficients, vibrational lifetimes and dipole moments in higher vibrational levels. Remaining questions concerning the position of the maximum of the EDMF may be resolved through experimental measurement of dipole moments of higher vibrational levels. The band strength of the 1-0 fundamental transition is computed to be 12 ± 2 cm⁻² atm⁻¹ in good

agreement with three experimental values, but larger than a recent value of $5 \text{ cm}^{-2} \text{ atm}^{-1}$ determined from infrared heterodyne spectroscopy. The theoretical methods used include SCF, CASSCF, multi-reference singles plus doubles configuration interaction (MRCI) and contracted CI, coupled pair functional (CPF) and a modified version of the CPF method. The results obtained using the different methods are critically compared.

Ie. L.G.M. Pettersson and S.R. Langhoff, "Theoretical Electric Dipole Moments and Dissociation Energies for the Ground States of GaH - BrH", to be published.

Note to be submitted to J. Chem. Phys.

Accurate dipole moments, dissociation energies and spectroscopic constants (r_e , ω_e) are computed for the second-row main group hydrides GaH - BrH. The computed dipole moments are within 0.05 Debye of the experimental values for SeH and BrH, while it is further underscored that the recently published experimental value (1.24 Debye) for GeH is probably in error and the theoretical value (0.1 ± 0.05 Debye) should be accepted as the correct result. Theoretical predictions for the dipole moments of GaH (0.37 D) and AsH (-0.24 D) are given. The theoretical dissociation energies provide accurate (within 0.1 eV) lower bounds to the actual values where in most cases only upper bounds have been obtained experimentally. The theoretical spectroscopic constants agree very well with experiment.

II. Current work.

Ila. Studies of small metal clusters: Be_{13} - Be_{55} , with C. Bauschlicher.

As an extension of previous work on Be_{13} and Al_{13} clusters we are studying Be_{55} and comparing the stability of the face-centered cubic (fcc) and the hexagonally close-packed (hcp) structures. Be metal is hcp while it was found for Be_{13} that the fcc structure is lower in energy. Convergence of cluster properties toward those of the bulk is an extremely important topic at the moment and an interesting question

is what number of atoms is required in a cluster to give the correct bulk structure. The Be_{55} cluster surrounds the Be_{13} cluster with the next layer of nearest neighbors, so that the ratio of bulk-like atoms to surface atoms is increased from 1/12 to 14/41. However, it is found that this increase in size is not sufficient to make hcp more stable, even though the difference in stability per atom is substantially decreased. It is found that the p-basis set expansion is very important for the binding energy of the cluster and more so for the hcp than for the fcc structure. In addition the ionization potentials were computed for the Be_{55} clusters and compared with the work function of the metal. The calculations were performed on the NAS CRAY 2 and involved some program development implementing the ECP code into the DISCO direct SCF program.

IIb. Studies of basis set effects on small Aluminum clusters, with C. Bauschlicher.

The effect of adding d-functions on Al is studied for Al_4 and Al_{13} fcc, hcp and icosaheder. It is found for Al_4 that the d basis set is more important than correlation for geometry and dissociation energy. A large effect is found when also a second set of d functions is added. For Al_{13} a similarly large effect is found on both geometry and dissociation energy for the first set of d functions. However, the importance of the second set is somewhat smaller in this case. It is found that the icosahedral structure is very near in energy to the hcp, while the fcc structure still remains higher in energy. It should be noted that Al metal has a fcc crystal structure.

IIc. Studies of alloys: impurities in Al clusters, with C. Bauschlicher and T. Halicioglu.

The structure of Al_{12} (Al_{13} with the central atom removed) was optimized for both hcp and fcc structures. This results in a substantial (3-4 eV) decrease in stability relative to Al_{13} . The central atom is then replaced with Be, C, Si, S, P, Cu, Ga, As or Ge and the effect on the geometry and binding energy as well as energy levels is studied in large scale SCF calculations. The work is expected to produce a new understanding of different impurities and properties of alloys.

IId. Systematic study of the second-row transition metal hydrides, with C. Bauschlicher, S. Langhoff and H. Partridge.

A study of the first-row transition metal hydrides at the SCF, single-reference SDCl, CPF, MCPF and CASSCF-multi-reference CI levels has recently been completed in this laboratory. As an extension of this work we are currently investigating the second-row transition metal hydrides using the same theoretical methods and including relativistic effects through relativistic effective core potentials or first-order perturbation theory. Special emphasis is put on the atomic d occupation of the metal atom, the type of bonding and the dipole moments of the hydrides. In addition we study the effects of basis set and 4s,4p correlation on the spectroscopic properties. So far, we have treated AgH, PdH, RhH and YH. Work has been initiated on RuH, TcH and ZrH.

Ile. Development of effective core potentials for the first two rows of the periodic table, with U. Wahlgren and O. Gropen.

The work to develop ECP descriptions for the first- and second-row atoms using the Roos-Siegbahn basis set is being completed with the development of descriptions for Sulfur and Phosphorus. The work involves development of ECP parameters and basis sets, tests of the ECP for the atomic excitation energies, comparison of molecular results obtained with the ECP with those from corresponding all-electron calculations. The molecular tests are fairly severe including extension of the basis set and performance at the SCF, CASSCF and CI levels of theory. When completed this work should greatly facilitate studies of large molecules involving these atoms. The ECP descriptions developed so far are already being used in the different cluster studies described above.

C / R. H. H. C

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: *April 7, 1986*

Associate Name: *Carol Stoker*

Laboratory: *NASA Ames Research Center*

Location: *Moffett Field, Ca. 94035*

Starting Date of Tenure *Oct. 15, 1986*

Adviser Name: *Richard Young*

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ASSOCIATESHIP
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I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. If requested, was the stipend advance available when you began tenure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Is the stipend being received regularly in a timely way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are your questions to this Office being handled courteously and efficiently?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments:

over...

2/5/85

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II. Laboratory functions

Yes No

- | | | |
|---|----------|----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>X</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>X</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>X</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>X</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>X</u> | <u>X</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>X</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>X</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>X</u> |

Comments: *I am experiencing great interaction and exposure to new and interesting things at NASA Ames. I am finding this to be a very valuable experience.*

Brief resume of progress:

Participated in Voyager encounter with Uranus and helped with preliminary data reduction for the "30 day report" of the results to be published in Science. In addition, I have made significant progress towards the goal of developing a radiative-convective model of the Uranus atmosphere.

General impression of program to date:

The group here at NASA Ames Theoretical Studies branch really places a high value on their NRC postdocs and they try very hard to get them involved. It is the people that make the program work.

Suggestions:

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MAR 23 1986
ASSOCIATESHIP
OFFICE

NATIONAL RESEARCH COUNCIL RESEARCH ASSOCIATE SIX-MONTH REPORT

WALTER E. WESTMAN, Date: April 1, 1986. Place of tenure: NASA Ames Research Center. Dates of tenure: October 1, 1985 - September 30, 1986.

Research Adviser: Dr. James G. Lawless

--- Travel on tenure:

--- a. Scientific seminars and meetings attended

National Park Service, Sequoia National Park, meeting of researchers dealing with acid deposition effects on vegetation, January 27-29, 1986, Ash Mountain, CA.

Environmental Protection Agency, workshop on effects of acid deposition on vegetation in the western United States (Chaired panel, on request of organizers), November 13, 1985, Corvallis, OR.

b. Stanford University, lecture to Conservation Biology class, February 21, 1986.

Publications and papers resulting from research as an Associate:

Rock, B. and Westman, W. 1986. Detecting air pollution stress to vegetation through remote sensing of effects on leaf chemistry. Bull. Ecol. Soc. Amer.: in press.

Work in progress:

I plan to spend April 7-22, 1986 conducting field work in the Santa Monica Mountains, California, as part of my planned research. During April 22-25, 1985, NASA aircraft will fly over my study sites, collecting remotely-sensed data from three sensors: color infrared camera, Thematic Mapper Simulator, and Airborne Imaging Spectrometer. The field work and flight will be repeated in September, 1986, at the end of the dry season.

Summary of research to date during Associateship:

The aim of my research has been to develop means to sense remotely the effects of air pollutants on native vegetation, focusing on the coastal sage scrub of southern California. To do this, I have sought to understand the relation of changes in leaf chemistry, anatomy, moisture content, and vegetation structure induced by pollution stress to spectral reflectance. I have carried out a series of laboratory experiments to test the effects of leaf layering, leaf moisture content, and leaf anatomy on spectral reflectance. These tests have shown that below 40% moisture content, a qualitative change in leaf anatomy causes dramatic changes in leaf spectral reflectance. I have also analyzed coastal sage species exposed to controlled levels of ozone and sulfur dioxide for leaf chemical constituents. I have shown that sulfur dioxide treatments significantly

raise the sulfur content of leaves, and that ozone treatments raise leaf nitrogen content. These results hold promise for differentiating pollutant effects through their differential effects on leaf chemistry. I have been able to predict these differences in leaf chemistry by changes in intensity of reflectance from oven-dried ground leaves subjected to pollutant stress, and will soon test these predictions on fresh leaves.

Appraisal of the Associateship program:

The program has provided me with an excellent opportunity to utilize remote sensing facilities and computer facilities that I have not had previous access to. I am also learning a great deal about remote sensing that will be very valuable to me in the future.

One minor suggestion concerning the Associateship program is that it would be most helpful to have travel advances a few weeks after they are requested. Under the present arrangement I have had to pay for airline tickets to scientific meetings as much as eight months before I am reimbursed.

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

61/ K H M D
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APR 9 1986

ASSOCIATESHIP
OFFICE

Date: 3/22/86

Associate Name: Alfred Buergi

Laboratory: NASA / GSFC
Lab. for Extraterrestrial Physics

Location: Greenbelt MD 20770

Starting Date of Tenure 9/2/85

Adviser Name: L. F. Burlaga

I. Associateship Office Functions

Yes No

- | | | |
|--|---|---|
| 1. Were the pre-start materials and instructions satisfactory? | X | — |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? (not requested) | — | — |
| 3. If requested, was the stipend advance available when you began tenure? | X | — |
| 4. Is the stipend being received regularly in a timely way? | X | — |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | X | — |
| 6. Are your questions to this Office being handled courteously and efficiently? | X | — |

Comments:

*) There were some problems with a request for medical insurance for my wife, however (A letter requesting this must somehow have been lost)

over...

2/5/85

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Is the space assigned reasonably adequate?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are you able to participate in local seminars, colloquia, etc.?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

Due to the Goddard Locator management I have still not got a library card after 7 (!!!) months. At the beginning it was at times hard to get simple supplies like paper or notebooks, since supplies had run out. These are not really serious problems, however.

Brief resume of progress:

The previous work on models of minor ions in the solar wind (cf. Bürgi and Geiss, 1986 ~~Sol. Phys.~~, in press) has been improved in several respects:

- Non-Maxwellian electron distributions have been included (K-distrib.).
- Work on models with a global, more realistic representation of coronal magnetic fields and overall dynamics of the solar wind is nearing completion.
- Some work has been done on a self-consistent description of non-Maxwellian electron transport. This is too large a project, however, to be finished under the present General impression of program to date: Fellowship, and has temporarily been stopped.

Very good: It gives an excellent opportunity to discuss scientific problems with experts in the field and to pursue research without interference from other obligations.

Suggestions:

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED
APR 23 1986
ASSOCIATESHIP
OFFICE

Date:

Associate Name: DAVID LEISAWITZ

Laboratory: NASA/GSFC LAB. FOR EXTRATERRESTRIAL PHYSICS

Location: GREENBELT, MD

Starting Date of Tenure 10/31/85

Adviser Name: DR. M. G. HAUSER

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. If requested, was the stipend advance available when you began tenure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Is the stipend being received regularly in a timely way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Are your questions to this Office being handled courteously and efficiently?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: * TRAVEL REQUEST SUBMITTED RECENTLY; NOT PROCESSED YET

over...

2/5/85

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II. Laboratory functions

	Yes	No
1. Was the laboratory ready to receive you and help you get started?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Is the space assigned reasonably adequate?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are you able to participate in local seminars, colloquia, etc.?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

* Occasionally, access to image processing equipment becomes a constraint on how my time is spent. This is because we have limited access to the "LAS VAX" at GSFC for image processing. Thus far, attempts to obtain an image processing terminal for the "LEP VAX" have failed due to funding problems. Note, however, that this is not a severe obstacle to my progress in general.

Brief resume of progress:

I began my tenure by improving my literacy in the field of infrared astronomy, familiarizing myself with current interpretative trends. I constructed models of what the infrared appearance of a molecular cloud subject to local heating would be. I outlined a program to show how the IRAS database and my observations of the molecular clouds near young star clusters could be used to improve our understanding of the physical properties of the clouds. Thus far, I have followed that program through the data

General impression of program to date: "processing" phase and have carried out a large portion of the analysis of the cloud properties. Some of my time has been spent in preparing my dissertation for publication.

***** EXCELLENT *****

(I particularly appreciate the independence as well as access to adequate facilities and colleagues who provide encouragement and stimulation)

Suggestions:

DON - CHANGE A THING !!

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

MAY 14 1986

ASSOCIATESHIP
OFFICE

Date: January 30, 1986

Associate Name: Kiyoshi Maezawa

Laboratory: NASA/GSFC

Location: Greenbelt, Maryland 20771

Starting Date of Tenure July 1, 1985

Adviser Name: R. A. Hoffman

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>✓</u>	<u>—</u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner? NA	<u>—</u>	<u>—</u>
3. If requested, was the stipend advance available when you began tenure?	<u>✓</u>	<u>—</u>
4. Is the stipend being received regularly in a timely way?	<u>✓</u>	<u>—</u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>✓</u>	<u>—</u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>✓</u>	<u>—</u>

Comments:

Generally, the booklet "Policies, practices, and procedures" has been very informative. However, as a foreigner, I knew little about the U.S. tax system, and felt it might be better if I was given more information on my tax obligation in the U.S., on the system of tax withholding, and on the federal tax return.

over...

2/5/85

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II. Laboratory functions

Yes No

- | | | |
|---|-------------|-------------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>✓</u> | <u> </u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>✓</u> * | <u> </u> |
| * See comments . | | |
| 3. Is the space assigned reasonably adequate? | <u>✓</u> | <u> </u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u> </u> | <u>✓</u> * |
| * see resumé below . | | |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>✓</u> | <u> </u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>✓</u> | <u> </u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>✓</u> | <u> </u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u> </u> | <u>✓</u> |

Comments:

My initial research adviser, Dr. M. Sugiura left the NASA/GSFC in september, 1985, and Dr. R. A. Hoffman kindly accepted to be my new adviser. I believe that I can pursue the objective of my research proposal without major alteration.

Brief resume of progress:

Archiving and retrieving principle of the DE data base is not suitable for the kind of correlation analysis that I intended to make. I therefore changed the scope of my analysis slightly in order to make less extensive use of computers. Extensive correlation studies between the IMF and the DE data are now being made by visually inspecting the summary plots, and certain interesting signatures of the IMF influence have been revealed.

General impression of program to date:

I think this program is giving me an opportunity to make a kind of research that I would be never able to do in Japan; The data from the DE satellites is exciting and I am enjoying working within the American scientific society.

Suggestions:

I have no particular suggestion at this time because I think the associateship program is working well.

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APR 14 1986

SIX-MONTH PROGRESS REVIEW

ASSOCIATESHIP
OFFICE

Kenneth J. Mitchell
NASA/Goddard Space Flight Center

April 4, 1986
Tenure: Sept. 30, 1985 -

Research Advisor: Dr. D. S. Leckrone (Dr. D. E. Weistrop)

Travel (A) Scientific Meetings: 1. Washington Area Neighborhood Astronomers Meeting
John Hopkins Applied Physics Lab (10/3/85)

- (B) Programmatic: 1. National Radio Astronomy Observatory (NRAO)
Charlottesville, VA (11/13/85 - 11/19/85)
2. Virginia Polytechnic Institute and State University
Blacksburg, VA (11/19/85 - 11/27/85)
3. Kitt Peak National Observatory (KPNO)
Tucson, AZ (3/18/86 - 3/21/86)
4. NRAO Very Large Array (VLA)
Socorro, NM (3/21/86 - 3/26/86)

Summary of Work in Progress

- (1) Astrophysical Properties of Quasars of Low Radio Luminosity: Second-epoch 1400 MHz VLA radio maps of a complete sample of weak radio quasar candidates have been made to search for radio variability. High-resolution VLA observations have been made on this sample from which maps will be produced to study their radio morphology. A proposal to obtain redshifts for these objects will be submitted to KPNO this fall.
- (2) In collaboration with Dr. D. Weistrop, optical identifications for a deep 5 GHz VLA radio survey will be sought using the Goddard - Laboratory for Astronomy and Solar Physics scanning microdensitometer. Astrometric software applicable to photographic plates taken with the KPNO 4-meter telescope is being implemented on the microdensitometer.
- (3) Data reduction and analysis is progressing for a five-year, five-frequency radio monitoring program to study the characteristics of low-frequency variability in active extragalactic radio sources. Recently a global VLBI experiment was conducted to search for small-scale structure in the low-frequency variables. This was one of the first VLBI experiments to use the phased VLA at 327MHz.
- (4) An experiment to detect short time-scale optical variability of active extragalactic objects and variable-star candidates using a CCD camera at the KPNO #1 0.9m has been conducted. The data will be analyzed in terms of both intrinsic variability of the program objects and the photometric accuracy of the technique.

Appraisal of the Associateship Program

I have found the people associated with the program here at NASA/GSFC to be very helpful. My time here has enabled me to make progress in a number of ongoing research projects as well as to branch out into a few new research areas.

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MAR 7 1986

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

ASSOCIATESHIP
OFFICE

Date: 2/28/86

Associate Name: Robert K Schaefer

Laboratory: Laboratory for High Energy Astrophysics, Code 665

Location: Goddard Space Flight Center, Greenbelt, MD 20771

Starting Date of Tenure 9/3/85

Adviser Name: Dr. Floyd Stecker

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|----------------------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>✓</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>✓</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>✓</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>✓</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>—</u> | <u>No experience</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>✓</u> | <u>—</u> |

Comments:

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2/5/85

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II. Laboratory functions

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>✓</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>✓</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>✓</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>✓</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>✓</u> | <u>—</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>✓</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>✓</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>✓</u> |

Comments:

Brief resume of progress: My paper concerning the anisotropy of the 3°K Cosmic Background Radiation has just been accepted for publication. This paper will be the basis for putting constraints on Cosmic string models to determine which models are viable. At present, I am calculating the anisotropy expected for

General impression of program to date: one such model (Stecker & Shafi
↓ Phys Rev Lett 50 928 (1983).)

The program is an excellent one. Not only am I finding that it suits my needs, but I am finding that a lot of my reference material has been written by NRC postdocs.

Suggestions:

21/1/86

NATIONAL RESEARCH COUNCIL
RESEARCH ASSOCIATESHIP PROGRAM
INTERMEDIATE REPORT (SIX MONTH PERIOD)

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APR 13 1986

ASSOCIATESHIP

Name : DR.Y.V.VENKATESH

Date : 6 April 1986

Place of tenure : NASA Goddard Flight Center, Greenbelt MD

Research Adviser : Dr.James P.Strong, NASA GSFC

On (Sabbatical) Leave from : Indian Institute of Science,
Bangalore 560012, India.

Position : Professor, Department of Elec-
trical Engineering.

Meetings attended : Group meetings on Image Processing at the
Information Analysis Facility, GSFC Code 636.

Publications : (Long Abstract) 'On the stereo-matching of SAR
Data for terrain height determination', to be
presented at the forthcoming International Con-
ference on Remote Sensing, Innsbruck, Austria
(co-authors: J.P.Strong and H.K.Ramapriyan).

Work in Progress : Implementation of a new algorithm for the
(non-stereo and) stereo-matching of satellite
images.

Summary of research during October 1985 - March 1986 : Enclosed.

Appraisal of the Associateship Program :

- a) It is a stimulating experience to continue research
in a well equipped laboratory such as the GSFC and
in a highly productive environment.

- (b) This program has enabled me to concentrate on a frontier research problem.
- (c) It would be of tremendous help to the scientists and their Families if the Health Units at the NASA -- Centers were to take care of health problems. As it is, considerable time is lost for minor ailments, even looking for the proper medical centers.

Resume of the research work done during
October 1985 - March 1986

A NEW PROCEDURE FOR MATCHING STEREO IMAGES

Y.V.Venkatesh

In computer vision, the well known basic problem is one of correspondence: for instance, in stereo images, points are to be matched for depth analysis; and in tracking objects in a sequence of images, one must establish which points in an object in one frame correspond to points in a succeeding frame.

The standard matching procedure involves

- (a) Selection of a template (or 'model') of the object which is embedded in a suitably-sized window smaller than the picture; and
- (b) Searching for the match points in the two (or sequence of) images by sliding the window over all permissible locations in the images; and evaluating a performance criterion for a satisfactory match.

In contrast with this, my present research work done here at GSFC, draws inspiration from Vander Lugt's paper on a coherent optical system for (optimum) spatial filters based on 2-D Fourier transformation and its inverse. A digital version of the optical processor is a correlation-based algorithm which has been implemented for (non-stereo and) stereo-matching, and tested on binary random-dot stereograms with discrete depth values of the synthetic 3-D scene.

A brief description of the algorithm follows: One of the images is correlated with the other and the correlation matrix (C) is evaluated for a restricted range of the indices (governed by the priori knowledge of the maximum disparity in the scene). The matrix (C) is then analyzed for local maxima whose locations are used for creating different fields which, after a labelling procedure (connected component / relaxation), lead to the depth map of the scene under study. The method is distinct from the techniques available in the literature.

Further planned work includes implementation of the algorithms on the mpp and application to satellite data, which will be reported later.

CT/ARM-5

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS
SIX-MONTH PROGRESS REPORT

Date: 4/25/86

Associate Name: Maria T Zuber

Laboratory: NASA/Goddard Space Flight Center

Location: Greenbelt, MD 20771

Starting Date of Tenure 10/29/86

Adviser Name: Steven C Cohen

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|----------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>✓</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>✓</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>✓</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>✓</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>✓</u> | <u>—</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>✓</u> | <u>—</u> |

Comments:

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>✓</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>✓</u>	<u>—</u>
3. Is the space assigned reasonably adequate? <i>But there is a space problem here and many other people have this problem too.</i>	<u>—</u>	<u>✓</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>—</u>	<u>✓</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>✓</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>✓</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>✓</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>✓</u>

Comments:

Brief resume of progress:

Presented papers at: 1) American Geophysical Union Fall Meeting (Dec '85); 2) 17th Lunar & Planetary Science Conference (Mar '86); 3) Barenz Univ.-Vernadsky Institute Symposium (Mar '86). Completing a paper on intraplate deformation of the sea floor in the Indian Ocean which I hope to submit to JGR within the next month. Currently developing theoretical models for the rheology of Venus' Lithosphere. I gave a Branch seminar on the Indian Ocean work in February.

General impression of program to date:

From a scientific standpoint the experience has been outstanding. I have had a great deal of interaction with the staff here and have been given everything I've needed in the way of equipment, data, computer time, and other support.

Suggestions:

The only major shortcoming that I've experienced so far has been with regard to taxes. The section in the handbook is extremely vague. For example, I've found out that I don't need to pay social security. Why was it necessary for me to dig through obscure pamphlets on tax tips for academics? Associates should at least be informed that these pamphlets exist, and better yet, the rules should be stated more clearly in the NRC rules & regulations handbook.

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

APR 8 1986

ASSOCIATESHIP
OFFICE

Date: April 2, 1986

Associate Name: Jean-Paul BERTHIAS

Laboratory: N.A.S.A./Jet Propulsion Laboratory

Location: 4800 Oak Grove Dr., PASADENA, CA 91109

Starting Date of Tenure 09/17/85

Adviser Name: Dr. R.W. Hellings

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	___
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	___
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	___
4. Is the stipend being received regularly in a timely way?	<u>X</u>	___
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	___
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	___

Comments:

over...

2/5/85

II. Laboratory functions

Yes No

- | | | |
|---|---------------|---------------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>X</u> | <u> </u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>X</u> | <u> </u> |
| 3. Is the space assigned reasonably adequate? | <u>X*</u> | <u> </u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u> </u> | <u>X</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>X</u> | <u> </u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>X</u> | <u> </u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>X</u> | <u> </u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u> </u> | <u>X</u> |

Comments:

- * Working space is relatively scarce at J.P.L. and it takes a few week before you can settle in your own office. However, this problem is not specific to R.R.A.'s and I have no reason to complain about my present situation.

Brief resume of progress:

During the first three months I have devoted my of my time to the computation of a few of the effects due to gravitational waves on Doppler ranging data. This should be applied to the correlation between residus of timing data from pulsars in the future. Since then I have started the covariance analysis of a new mission, the ranging to the lander on Phobos. This work is still in its first stage, however a preliminary analysis just completed leads us to be rather optimistic concerning our ability to obtain new and improved scientific data from this future experiment.

General impression of program to date:

EXCELLENT

Suggestions:

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OF POOR QUALITY

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

MAY 16 1986

ASSOCIATESHIP
OFFICE

SIX-MONTH PROGRESS REPORT

Date:

Associate Name: WALTER D. GONZALEZ

Laboratory: JET PROPULSION LAB

Location: PASADENA - CAL.

Starting Date of Tenure NOV. 11 / 1985

Adviser Name: BRUCE T. TSURUTANI

I. Associateship Office Functions

Yes No

1. Were the pre-start materials and instructions satisfactory? EXEMPT AS
COMPLETED
✓ 3/2/86
2. If requested, was the relocation and travel advance handled in a satisfactory manner? ✓
3. If requested, was the stipend advance available when you began tenure? ✓
4. Is the stipend being received regularly in a timely way? ✓
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? ✓
6. Are your questions to this Office being handled courteously and efficiently? ✓

Comments: (I UNDERSTAND THAT THIS IS A DIFFICULT ^{*} PROBLEM ANYWAY)

WHEN A CANDIDATE FOR A NRC-TENURE AT A LABORATORY LOCATED IN A CITY WITH A HIGH COST OF LIVING HAS A LARGE FAMILY, IT WOULD BE HELPFUL IF THE NRC ADVISES HIM (OR HER) THAT THE TYPICAL NET MONTHLY STIPEND OFFERED BY THE NRC COULD TURN OUT TO BE SOMEWHAT MARGINAL. IF THE CANDIDATE FINDS OUT ABOUT THIS BY HIMSELF (OR HERSELF), THERE OVER... IS A PROBLEM: IF HE (OR SHE) WANTS TO GIVE UP IT WILL BE ALMOST IMPOSSIBLE TO DO IT, DUE TO THE REQUIREMENTS TO PAY BACK FOR AIR TICKETS AND ACCOMMODATION EXPENSES (NOT MENTIONING THE STIPEND ADVANCE).

* AND PERSONAL

65

II. Laboratory functions

Yes No

- | | | |
|---|----------|----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>✓</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>✓</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>✓</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>✓</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>✓</u> | <u>—</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>✓</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>✓</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>✓</u> |

Comments:

SO FAR ALL LABORATORY FACILITIES ARE FINE AND SUITABLE IN ORDER TO ACCOMPLISH THE OBJECTIVES OF MY RESEARCH PROPOSAL.

Brief resume of progress: SEVERAL INTERESTING RESULTS HAVE BEEN ALREADY OBTAINED. THEY ARE THE TOPICS FOR SEVERAL PRESENTATIONS AT RELATED CONFERENCES AND FOR SOME PAPERS TO BE PUBLISHED.

General impression of program to date:

WORKING AT JPL REPRESENTS A UNIQUE OPPORTUNITY IN THE AREA OF INTERPLANETARY PHYSICS, DUE TO THE LARGE AMOUNT OF DATA STILL AVAILABLE FOR NEW STUDIES. AFTER EVEN A FEW MONTHS ^{ONLY OF} WORKING AT JPL ONE FINDS ONESELF AT THE FRONTIER OF RESEARCH.

Suggestions:

NATIONAL RESEARCH COUNCIL
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SIX-MONTH PROGRESS REPORT

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Date: May 27, 1986

Associate Name:
Shiro Hatakeyama

Laboratory:
Jet Propulsion Laboratory

Location:
4800 Oak Grove Drive, Pasadena, California 91109

Starting Date of Tenure
November 20, 1985

Adviser Name:
Ming - Taun Leu

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	—
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	—
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	—
4. Is the stipend being received regularly in a timely way?	<u>X</u>	—
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	—
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	—

Comments:

over...

2/5/85

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u> </u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u> </u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u> </u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u> </u>	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	<u> </u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u> </u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u> </u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u> </u>	<u>X</u>

Comments:

JPL has a good apparatus for my study. I can extend the field of my work according to my interest. Academic circumstances are also very stimulating for me.

Brief resume of progress:

Very slow reactions between reservoir species and stable molecules are monitored by means of long path FT-IR spectroscopy. $\text{HO}_2\text{NO}_2 + \text{HCl}$, $\text{ClONO}_2 + \text{HCl}$, $\text{ClONO}_2 + \text{H}_2\text{O}$, and $\text{N}_2\text{O}_5 + \text{H}_2\text{O}$ were studied. Upper limits for the gas-phase reaction rate constants were obtained and a very heterogeneous nature of the reactions ~~was~~ suggested.

General impression of program to date:

The program gave me a very good opportunity not only to extend my interest of research but also to get acquainted with many scientists ~~now~~ working very actively in the field I am interested in. I am satisfied very much.

Suggestions:

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SIX-MONTH PROGRESS REPORT

Date: 4/30/86

Associate Name: GARY HERMAN

Laboratory: J. P. L.

Location: PASADENA

Starting Date of Tenure NOV. 7 1985

Adviser Name: Dr. PAUL WEISSMAN

I. Associateship Office Functions

Yes No

- | | | |
|---|-------------------------------------|--------------------------|
| 1. Were the pre-start materials and instructions satisfactory? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. If requested, was the stipend advance available when you began tenure? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4. Is the stipend being received regularly in a timely way? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Comments:

over...

2/5/85

II. Laboratory functions

Yes No

- | | | |
|---|---|---|
| 1. Was the laboratory ready to receive you and help you get started? | — | ✓ |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | ✓ | — |
| 3. Is the space assigned reasonably adequate? | ✓ | — |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | ✓ | — |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | ✓ | — |
| 6. Are you able to participate in local seminars, colloquia, etc.? | ✓ | — |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | ✓ | — |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | — | ✓ |

Comments:

I was required to move 4 times in the first 8 weeks I was here. I am now in a comfortable room & thus my work is progressing very well. I had no trouble accessing computer time, but it was only last month.

Brief resume of progress: I was able to obtain a terminal.

My work is progressing well. I will have material submitted for publication next month and am very happy about the general direction it has taken me.

General impression of program to date:

I have enjoyed the freedom of the program and have been impressed by the readily available help from the Associateship office. Perhaps my only complaint was more choice in the

suggestions: form of a medical plan.

Please note my new address. 15600 Mulholland Dr.
L.A. 90077

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ASSOCIATESHIP
OFFICE

SIX-MONTH PROGRESS REPORT

Date:

4/29/86

Associate Name:

Ulf E. Israelsson

Laboratory:

Jet Propulsion Lab.

Location:

Starting Date of Tenure 11/5/85

Adviser Name:

Dr. Dusan Petrac

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|---|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | — |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | — | — |
| 3. If requested, was the stipend advance available when you began tenure? | — | — |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | — |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | — | — |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | — |

Comments:

over...

2/5/85

II. Laboratory functions

Yes No

- | | | |
|---|----------|----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>X</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>X</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>X</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>X</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>X</u> | <u>—</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>X</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>X</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>X</u> |

Comments:

Brief resume of progress:

General impression of program to date:

Suggestions:

Progress report

Ulf E. Israelsson 5/5/86

A Cryostat capable of reaching temperatures of 1.2 K and modified to allow use of very high electric fields is now operational.

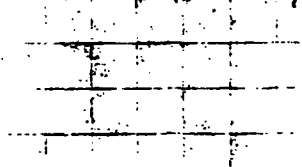
An experimental cell with parallel plate geometry has been built, and used to study the effects of strong electric fields on both superfluid and normal liquid ^4He .

We find that an electric field of 10^7 V/m raises the liquid level between the plates by 17.8 mm. This is in detailed agreement with theoretical predictions.

In the same cell we have also investigated the breakdown strength of a liquid/vapour Helium interface as a function of material, and surface conditions.

An elaborate cylindrical geometry flow cell has been designed and built, to study electric field effects on superfluid gravitational film flow. The cell is operating according to specifications, and experiments are currently in progress.

Designs and drawings for the addition of a ^3He pot with gas handling system to our existing apparatus have been made. The ^3He pot will allow us to extend our studies to 0.3 K, and will allow studies of the phase separations of $^3\text{He}/^4\text{He}$ mixtures.



NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 3-14-86
Associate Name: Nancy Gray Maynard
Laboratory: Jet Propulsion Lab
Location: Pasadena, California
Starting Date of Tenure 9-2-85
Adviser Name: Frank Carsey

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I. Associateship Office Functions

	Yes	No
1. Were the pre-start materials and instructions satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. If requested, was the stipend advance available when you began tenure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Is the stipend being received regularly in a timely way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are your questions to this Office being handled courteously and efficiently?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments:

over...

2/5/85

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II. Laboratory functions

Yes No

- | | | |
|---|----------|------------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>✓</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>✓</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>✓</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>✓</u> * |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>✓</u> | <u>—</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>✓</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>✓</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>✓</u> |

Comments:

- * In order to carry out the project agreed upon between adviser and associate, we made arrangements to use the computer, image processor, and some equipment at Scripps Institution of Oceanography in La Jolla California. This has worked out well because I have had access to personnel, equipment, and expertise at both institutions.

Brief Resume of Progress:

1. see attached for publications and presentations
2. in process of setting up joint U.S.-Icelandic scientific program and will be in charge of U.S. part of the science conducted during this experiment
3. will be receiving ONR funding for computer time and some travel for Iceland experiment

General Impression of Program to Date:

This is an excellent program for providing the opportunity to return to research!

Suggestions:

Publications and Presentations Resulting from Work as Associate

- a. November, 1985. "Mesoscale Features in the Marginal Ice Zone" Presented at Oceans '85 Symposium on Ocean Color Observations: A New Environmental Perspective. Scripps Institution of Oceanography, La Jolla CA
- b. January 15, 1986. "Satellite Observations of Phytoplankton Pigment Distribution at the Marginal Ice Zone" (Invited paper) Presented at the American Geophysical Union Meeting. New Orleans LA.
- c. April 2, 1986. "Coastal Zone Color Scanner Imagery of Phytoplankton Pigment Distribution in Icelandic Waters" Presented at Ocean Optics VIII Conference. Orlando FL. To be published in SPIE Conference Proceedings (International Society for Optical Engineering) (with Dennis K. Clark)
- d. June 1986. "Coastal Zone Color Scanner Imagery in the Marginal Ice Zone" To be published in special issue on ocean color imaging of Marine Technology Society Journal.
- e. June 1986. Paper submitted to Committee on Space Research (COSPAR of ICSU) for meeting in Toulouse, France. (with Vittorio Barale)
- f. November 1986. Paper in preparation to go into special issue of Journal of Geophysical Research on the marginal ice zone.

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 5.19.86

Associate Name: MURRAY J. McLEWAN

Laboratory: Jet Propulsion

Location: Pasadena CA

Starting Date of Tenure Nov 25, 1985

Adviser Name: Dr. W. T. Hunter, Jr.

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>✓</u>	<u>—</u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>XNA</u>	<u>—</u>
3. If requested, was the stipend advance available when you began tenure?	<u>✓</u>	<u>—</u>
4. Is the stipend being received regularly in a timely way?	<u>✓</u>	<u>—</u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>✓</u>	<u>—</u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>✓</u>	<u>—</u>

Comments:

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Is the space assigned reasonably adequate?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are you able to participate in local seminars, colloquia, etc.?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments: The program of TPL is administered courteously and efficiently.

Brief resume of progress: The program to date has been very satisfactory. One of the main objects of the investigation was to examine association processes between ions and molecules. The results we have achieved thus far are very exciting and should bear the basis for 3 publications. In brief some association processes have been observed to be extremely rapid and now these processes must be included in planetary atmospheric models.

General impression of program to date:

I was very impressed with the program at my last experience at it in 1977 and am equally impressed on this visit. I feel the program offers a wonderful opportunity to visitors like myself to contribute to the research programs in the host institution and at the same time benefit the visitor. For example I am able to make measurements of TPL that I could not in my home institution but at the same time the measurements we make at TPL will benefit from work I have done at Canterbury.

SAE Technical Paper Series

851513

Development of a Vibration System for the Study of Whole-Body Vibration Effects on Drivers

A. Purdy,
D. Simic,
W. Conner,
and D. Dunn

National Institute for Occupational
Safety and Health

1985 International Off-Highway & Powerplant
Congress & Exposition
MECCA, Milwaukee, Wisconsin
September 9-12, 1985

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Development of a Vibration System for the Study of Whole-Body Vibration Effects on Drivers

A. Purdy,
D. Simic,
W. Conner,
and D. Dunn

National Institute for Occupational
Safety and Health

ABSTRACT

The National Institute for Occupational Safety and Health (NIOSH) is engaged in research on the effects of whole-body vibration (WBV). The purpose of this research is to quantify the decrement in performance, such as reaction time and continual manual control tracking tasks, caused by WBV. Such decrements may have a bearing on the safety and health of approximately seven million drivers of trucks, buses, tractors, and off-the-road vehicles who are exposed to WBV. To study these effects in the Laboratory, the WBV team at NIOSH has designed and developed a new vibration system. This paper describes the theoretical basis and the main design and construction features of the vibration system for simulating the driver's vibration environment as well as the research possibilities and limits. A hydraulic cylinder and pivoted frame made the concept of a pendulum vibration system a reality. The driver module is designed to simulate a heavy-vehicle driver's environment with a typical control configuration. Depending on the driver's module position this Vibration System can produce vibration in three axes of translation and two of rotation, either singly or mixed.

THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH) is concerned with the effects of whole-body vibration on the safety and health of over seven million drivers of trucks, buses, and heavy off-the-road vehicles.

It is well known that human factors are involved in about 70 to 80% of accident situations, while the remainder is due to vehicle, or environmental causes (1,2). Direct and clear evidence relating psychomotor performance to traffic safety is limited. There are few data correlating the effects of whole-body vibration and degradation of psychomotor performance of the driver. Nevertheless, there are numerous research studies which describe the effects of whole-body vibration on the performance of tasks. Continual manual control systems with a visual display usually were employed in compensatory or pursuit tracking performance tasks. Some of these investigations only refer to the effects of single axis vibration (3). Often these investigations attempt only to answer the question of whether vibration does or does not impair the performance of the tasks, or they refer only to the comparison of the effects of a single mode of vibration on the performance of a task (4). Most of these papers are concerned with helicopters or airplane vibration environments.

A few investigations refer to the relationship of driver performance to WBV. Some of these have been conducted in the Bostrom Research Laboratories (5,6,7,8). More recent reports refer to the general problem of the human operator, or specific aviation problems.

Gillespie, et al, 1982 reported the current findings on the links between truck induced vibration and accidents. Our knowledge linking truck vibration to effects on driver performance, and ultimately accident involvement, was judged insufficient at that time to establish a cause-effect relationship (9).

The effects of mode and duration of WBV on driver performance, especially on tracking and reaction time remain an open question. Any decrement in performance however, could relate directly to safety issues. In part, the goal of our research in WBV is to quantify the decrement in performance caused by WBV. The performance decrement induced by WBV may be a risk factor associated with the safety and health of approximately seven million drivers of trucks, buses, tractors, and off-the-road vehicles who are exposed to WBV on a daily basis. The vibration system, described in this paper, offers an improved laboratory approach to simulating actual field conditions experienced by heavy vehicle drivers.

VEHICLE VIBRATION RESPONSE AND DRIVER ENVIRONMENT

A vehicle is a complex dynamic vibratory system which responds to excitation inputs from the road, wheels and engine. The peak of vertical acceleration is associated with spring mass resonances that lie in a frequency range of 1 to 4 Hz. The suspension system, speed, and the load conditions determine the influence of the vertical peak acceleration.

The second dominant acceleration is from the pitching motions, resulting from the angular vibration about the lateral vehicle axis. The horizontal (fore-aft) acceleration derives primarily from the pitching motions of the vehicle (9). The vertical accelerations are also associated with the fore-aft acceleration derived from the pitching motion. The road bumps will excite the front wheels first and then the rear wheels, which results in the pitching motion. The peak of pitching acceleration is in the range of 3-5 Hz. It is known that the wheel base coupled with the vehicle speed causes a "filtering", such that a vehicle does not respond to certain modes of vibration, and road frequency inputs.

Figure 1 shows two pure theoretical cases, which demonstrate pure vertical, or pure angular (pitching) vibration.

The more realistic situation is shown in Figure 2. A vehicle is vibrated by combined angular frequencies, depending upon the ratio of front and rear spring deformation (u_1/u_2) and mass distribution ($c=c_0^2/ab$). In any case, the vertical vibration is superimposed on the pitching vibration. When the angular vibration is about a center of rotation far from the subject it will be sensed as the translator (vertical) vibration, the rotation center P in Figure 2. The angular vibration about the pitch center located in the wheelbase will generate predominantly fore and aft accelerations around the rotation center Q in the Figure 2.

It is obvious that some lateral vibration (y-direction) and angular vibration about the vehicle long axis (rolling) are generated, even on a straight road, but are not dominant.

VIBRATION SYSTEM AND DRIVER ENVIRONMENT

The National Institute for Occupational Safety and Health (NIOSH) has designed and developed a WBV - hydraulic system which permits improved simulation of the vibration and operating environment of the driver.

The vibration system is custom built. It consists of a hydraulic cylinder-shaker (1) and a frame assembly (2), as seen in Figure 3. The vibration apparatus is a modification of a custom-built MTS Corporation Hydraulic Shaker (Model 910.24). This basic system is composed of an hydraulic pump and reservoir, a double acting hydraulic cylinder, an hydraulic

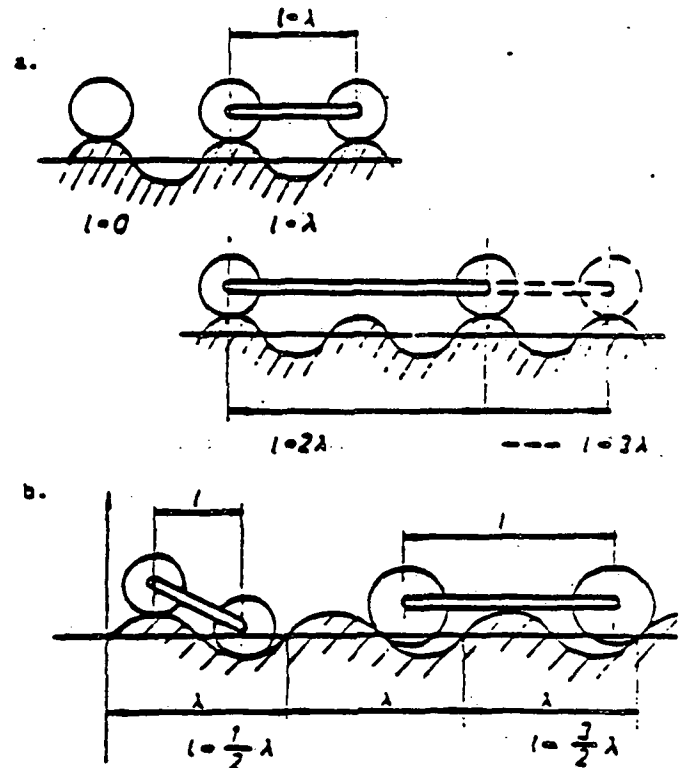


Figure 1: Two special cases of "Wheelbase Filtering"

- a. Pure vertical motions
- b. Pure angular motions

modulation valve, and an electronic control system which is completely solid state and employs a servo-type electronic controller. The shaker assembly is capable of driving up to a 340 kg load at a maximum vertical peak acceleration range of 9.81 m/s^2 (1 g) at 2 Hz, to 98.1 m/s^2 (10 g) at 100 Hz. The

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maximum displacement and velocity range is ± 127 mm and ± 1.27 m/s, respectively. Inputs of the system can be accepted from any of three sources: 1) sine generator, 2) mixer, or 3) magnetic tape recorder. The system will be used in the frequency range from 0.5 to 30 Hz.

The shaker frame is built from standard steel beams. Its external dimensions are 3800 x 1485 mm; internal dimensions are 3650 x 1335 mm; profile height 200 mm.

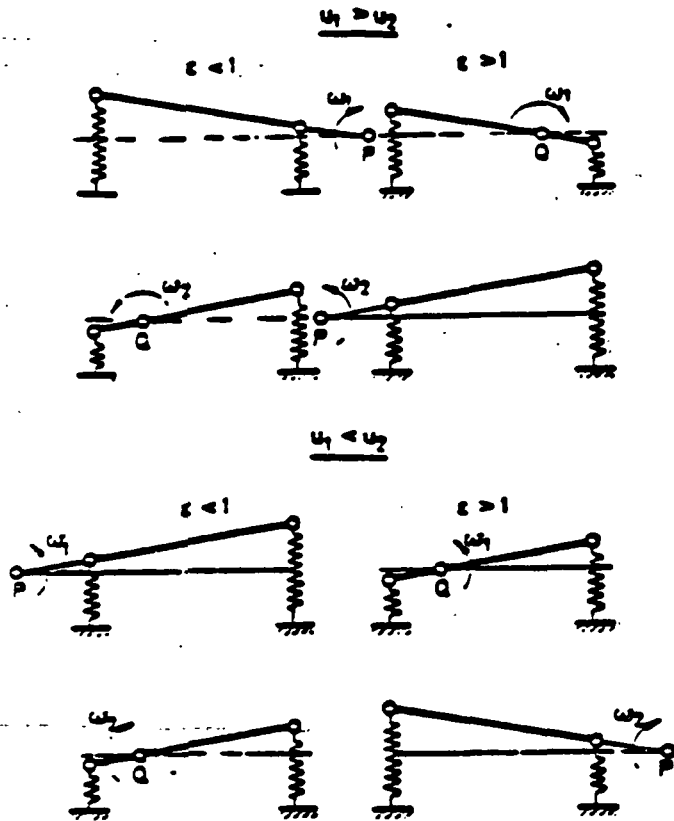


Figure 2: The Angular Vibration of a Vehicle about Two Rotation Centers

Figure key:

u_1, u_2 - Front and rear spring deformations;
 c - Coefficient of a vehicle mass distribution defined as $c = p^2/ab$ where are:
 p - radius of inertia and
 a, b - distances of vehicle CG. to the front and rear axis.
 ω_1, ω_2 - lower and higher resonance frequencies.

The major modification of the system has been the addition of a shaker frame assembly which can be pivoted at 1.2 or 2.4 m from the shaker's cylinder (B and B' in Figure 3). These two distances permits the generation of different rotation angles with the same shaker's piston displacement.

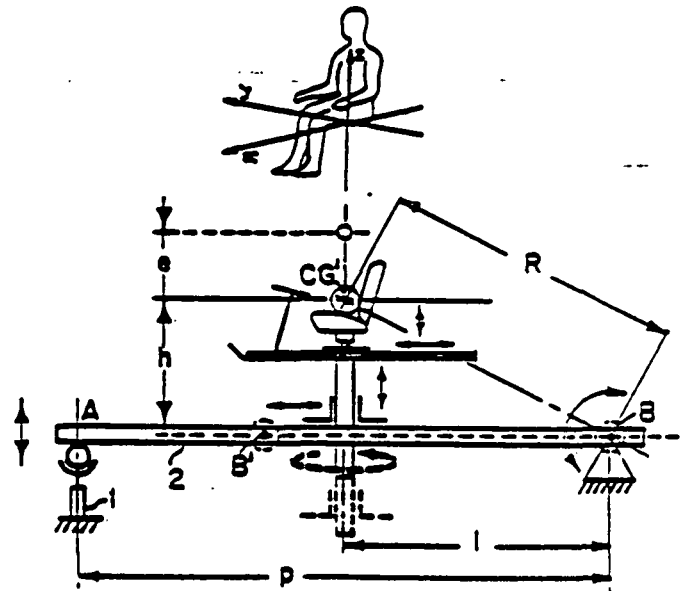


Figure 3: Design Concept of Pendulum Vibration Mode Generator

The hydraulic shaker is joined with the frame assembly through a universal joint, (A, in Figure 3; Figure 4).

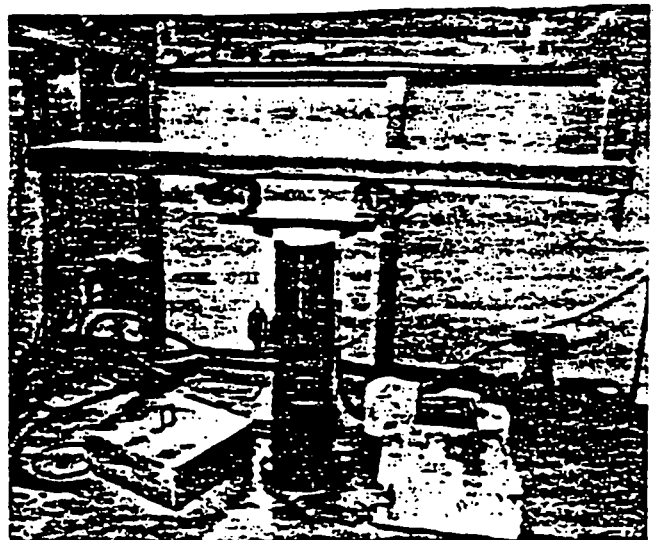


Figure 4: Joint Between Hydraulic Shaker and Frame Assembly

Figure 5 shows the entire frame with the side supporting bearings of shaker frame.

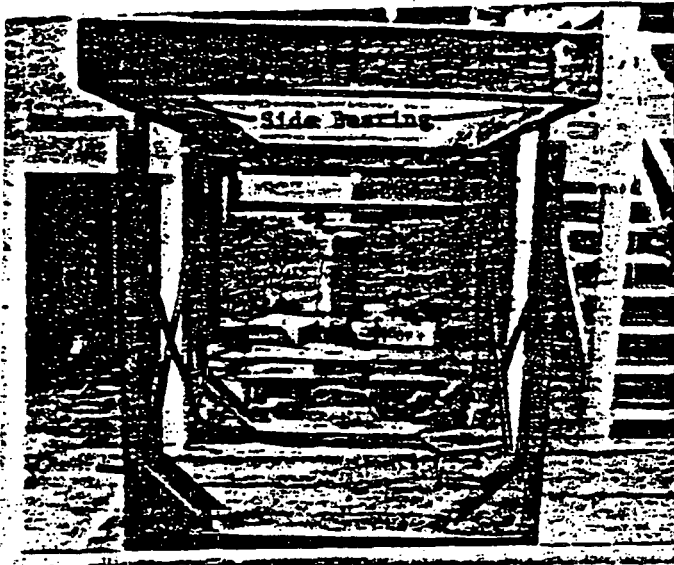


Figure 5: A View of the Frame Assembly; note the Side Mounted Bearing Supports

The hydraulic cylinder and pivoted frame assembly made the concept of a pendulum vibration system a reality. This permits the generation of many "pendulum" modes of vibration. Depending on the seat position, it is possible to generate a variety of mixed vibration modes. The same vibration system concept was used to investigate the human response to angular vibration (pitching) and complex modes of vibration in the x - z plane (10,11,12). The vibration system reported in this paper allows combined modes of vibration in the x - y - z axes.

Figure 6 shows the driver module which can be rotated about its vertical axis(A). It is supported by a sliding frame subsystem(B). Characteristic positions for the seat when the driver module is moving in the xz plane are shown in Figure 7. Figure 8 shows the typical seat positions in yz and xyz planes for a driver module rotation. The most general case is given by the seat position (l, h, θ) where l , h and θ are different from zero coordinates defined in Figures 7 and 8.

Depending on the ratio h/l and magnitude of angle θ , the vibration system can generate a wide range of combinations of more than one mode of vibration. The custom-made driver module is designed to simulate a heavy-vehicle driver environment. The base of the module is a 1.2 m circular metal plate that can be rotated 360° around its central axis and lowered below the frame plane. In the lowest seat position the subjects center of gravity

(CG) will be located below the frame plane. Mounted on the base are a brake, clutch,

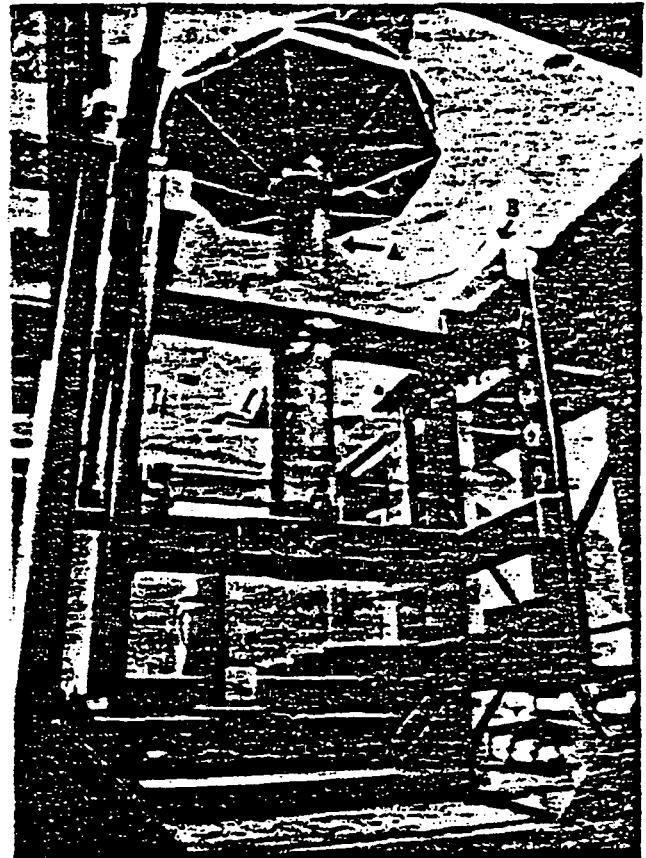


Figure 6: Driver module with sliding supporting system (a view from below) Vertical Axis (A), Sliding Frame (B).

accelerator pedal, a gear shift control stick, the supports of a metal instrument panel, a steering wheel, and a Bostrom 710 E soft-cushioned truck seat. The seat can be changed with different types used in buses, trucks, and heavy off-the-road vehicles. All the above apparatus are located in positions similar to those found in a truck cab (see Figure 9). Two identical driver modules have been constructed. One module is on the frame assembly and the other module is placed on a concrete floor and is used for control and non-vibration experimental conditions.

Figure 10 shows the driver module with the driver control configuration. The driver compartment dimensions are given in Figure 11. The truck driver seat (Bostrom 710E) is adjustable in the horizontal and vertical direction and has a lumbar adjustment. The measures given in Figure 11 correspond the mean seat position.

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The vibration system has several safety features, including a subject's emergency shut

with the subject from the central console by means of video monitors, microphones, and headphone receivers.

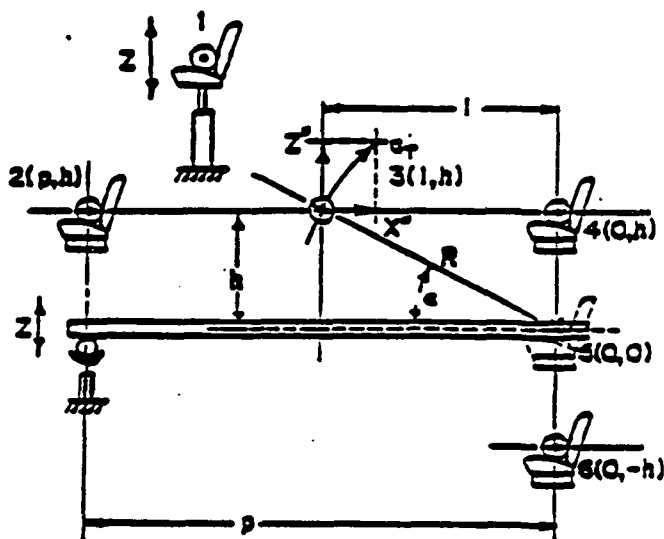


Figure 7: Characteristic seat positions in xz-plane.

down switch (located on the steering wheel's horn button), an experimenter's emergency shut down switch (centrally located on the control console), an automatic linear motion limit shut down relay, and an automatic acceleration limit shut down relay. In addition, the circuit controls are designed to avoid acceleration shocks due to loss of power, overheating, and loss of hydraulic pressure to the system. These safety features assure that the human subjects will not be accidentally injured and that they can terminate the vibration, at will, if they feel uncomfortable. The operation of the vibration system is controlled from a remote console (see Figure 12). From this console, the experimenter is able to constantly check the hydraulics and electronics systems of the shaker. He is also able to monitor and record the direction and acceleration of the vibration system as well as the human subject.

The data outputs from the mechanical system and human subjects are transmitted with the appropriate accelerometers (Kulite, model KS-125; Statham, model A-377C; Entran, model EGAL-125; and Endevco, model VT-3) and amplifiers (Honeywell, model 118-1). The accelerometer signals can be monitored on-line with oscilloscopes (Beckman, model EO1-18; Tectronics, model 121N) and/or permanently recorded for later analysis on recording oscillographs (Soltec, model 3316) or FM tape recorders (Honeywell, model 5600-C). The experimenter has visual and auditory contact

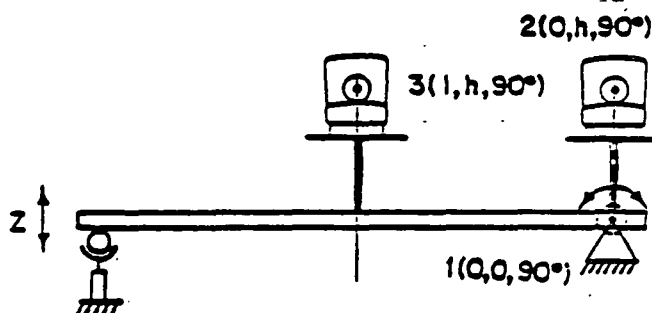


Figure 8: Some possible seat positions in yz and xyz planes, that result in varying degrees of subject rotation.

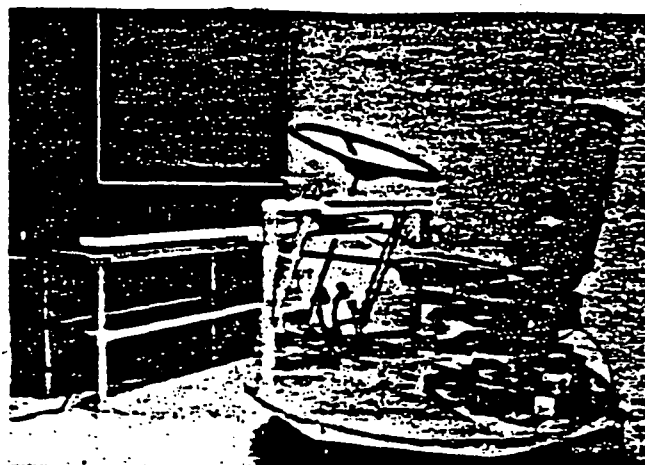
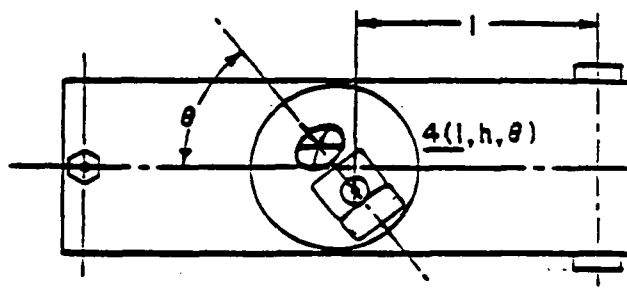


Figure 9: Driver module with large screen visual monitor (RCA video model PVR 500 PR).

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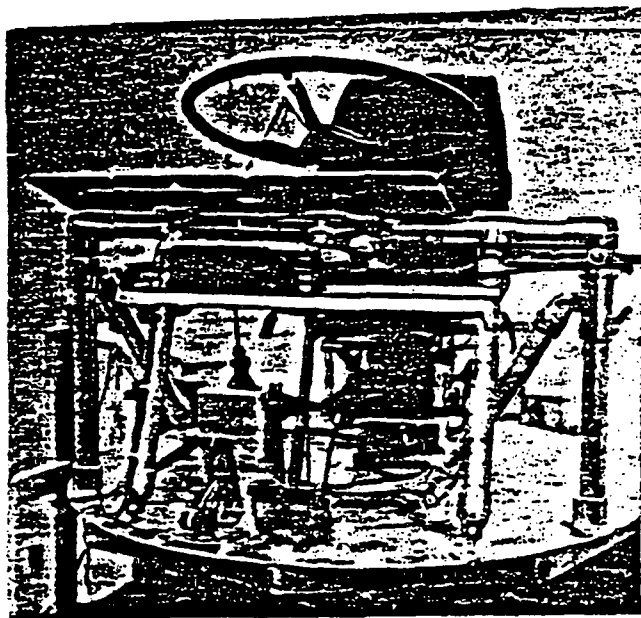


Figure 10: Driver control configuration



Figure 11: Driver Compartment dimensions for
main seat position (in mm)

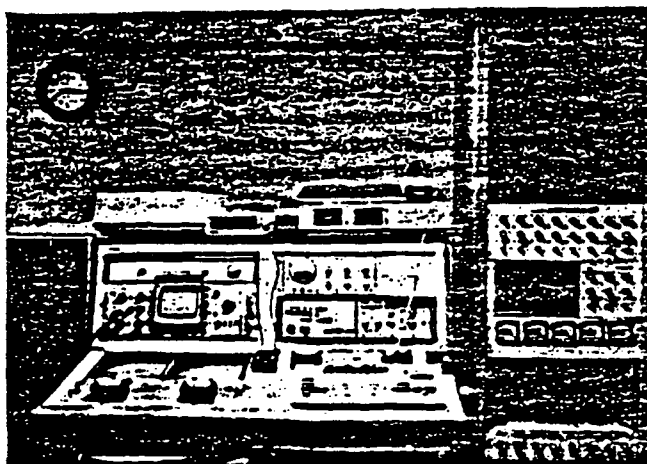


Figure 12: View of the control console

SUMMARY AND CONCLUSIONS

The Vibration System (VS) can produce a variety of different "pendulum vibrations". Depending on the seat position in relation to the frame rotation axis, the VS can produce either single or mixed mode vibration in three axes of translation and two of rotation. The different modes of vibration are synchronized. There is practically an infinite number of possible amplitude ratios between the five modes of vibration. This VS design and assembly represents a relatively inexpensive system which offers flexibility for WBV research studies. It is designed to simulate a heavy-vehicle vibration environment with a driver control configuration. The primary goal of this research is to investigate the decrement on driver performance under different vibration modes and frequencies. As reported, all translation modes of vibration are generated by means of rotating the seat about the frame axis. Because of a limited and relatively small magnitude of the radius, a small rotation might be sensed in the translation mode of vibration. In many cases that fact would in part reflect actual operating conditions. This vibration system offers an improved laboratory approach to simulating actual field conditions by heavy vehicle drivers. The vibration system facilitates investigations of the different types of human response to WBV as well as research on physical, biomechanical and psychophysiological human characteristics by WBV exposure.

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Torsion Dynamic Load Analysis of Passenger Car Body

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ABSTRACT

Reliable replacement of road tests with the appropriate laboratory ones is possible if the loads corresponding to those in the field are simulated under laboratory conditions, or if there is a correlation between automobile usage load conditions and the laboratory simulated load spectrum. In this report, experimental research is presented on the torsion vibration-deformation of the car body under actual operating conditions. The purpose is to collect the necessary data for development of appropriate methods in accelerated laboratory tests. This report discusses the vehicle load classification in terms of stress, the torsion stress and car body life, the modes for measurement, development of a device for measurement of torsion deformations in vehicle operating conditions, and applied instrumentation.

The results are given in the form of loads-amplitude-distribution curves depending on the class of road. The cumulative spectrums of loads are shown and the fatigue curves (in form $M^m = \text{const}$) are given.

IN THE DESIGN OF AN AUTOMOTIVE STRUCTURE, one of the more important tasks is to determine the life of the assemblies, subassemblies and components and to ensure that they will not fail prematurely. The dynamic loads of a road vehicle, its assemblies, subassemblies and components under actual operative conditions are influenced by many factors. All together, they define the distinct operational load conditions. They have a randomized character. Currently there are no standardized laboratory load conditions of

the car body, which might enable us to apply simple methods for estimating the stress and fatigue of a car body. One primary reason is the complexity of the car body structure, which is reflected first in the geometry of the structure and then in the large number of components as well as the mixed load modes and conditions.

The integrated car body structure, which is always used in passenger cars, is subjected to a variety of vibrations and dynamic loads which are transmitted from the road. In addition the body experiences coupled vibrations with subassemblies or components. Vehicles with a classical frame ("body over-frame construction") such as trucks and many other working and commercial vehicles enable more accurate design analysis for stress and fatigue. Car body construction, in some aspects, is a matter of experience rather than analytic calculations. The lack of accurate methods for laboratory testing of car body stress and fatigue results in costs for road testing and a significantly longer time for the development of new models. Usually, it is necessary to repeat the road testing several times, which increases the costs and time for development of the car. Our experiences show that the road testing requires 10 to 20 times longer and 10 to 30 times greater costs than laboratory testing, see (1) and (2). The main load conditions of car body stress might be classified as follows:

- Static stress due to vehicle weight;
- Static stress due to the road roughness;
- Dynamic stress due to road roughness by straight road and constant speed movement;
- Dynamic stress due to the acting of longitudinal forces (acceleration, braking, road roughness and road configuration);

Dynamic stress due to the acting of the lateral forces (primarily due to road curvature);

Dynamic stress due to the unbalanced and unequilibration of the assemblies and subassemblies.

It is obvious that in real operating conditions the car body structure is subjected to all kinds of the above mentioned stresses, which could be pronounced more or less to single or to mixed stress-modes. It is well known that in the higher frequency range, panel vibrations appear as the local vibrations, which are identified as acoustic noises. In the lower frequency range a whole body structure is involved in bending and torsional vibrations, caused by the above listed dynamic loads.

The level of vibration loads depend on the road roughness and speed. Based on several previous experimental investigations, the bending stresses are relatively small in comparison with torsion stresses to which a car body is exposed under actual road conditions (1), (3), (4). The results of one such analysis for American passenger cars (4) has shown that the amounts of bending deformations are 0.18 to 3 mm, while the amounts of torsional deformations are 6 mm/m to 33 mm/m. In both cases the lower values refer to the entire car, and the higher values refer to the bare car body.

DEVELOPMENT OF MEASUREMENT DEVICES

To assess car body load and stress we have developed and tested two measuring systems and three special measurement devices. One device consists mainly of a transducer and a level-classifier, as shown in Fig. 1. One rigid frame (6) was mounted on the car at the rear damper supporting points. On the other side of the frame the slide portion of the potentiometer (5) was mounted. One slidewire resistor was

placed on the instrument panel. In electrical terms, the divided potentiometer's transducer represents the half bridge. Current supplied from the voltage source (1) through the special stabilizer (2) has an output voltage of 10 V. The classifier coupled with the potentiometer transducer records the number of overshoots from preset levels (8 levels above 0 and 8 levels below 0).

Besides the above described device, two others were developed utilizing the strain gauges. Figure 2 illustrates one of them. This device represents one frame which consists mainly of one long "specimen," designed as a torsion bar fastened with two quer supports.

On the middle part of the tubular "specimen" strain gauges are attached for torsion measuring. Each quer support end was supplied with an appropriate coupler which serves to fasten the device on the car roof (RMD - Roof Measurement Device). In this preparatory phase, we were looking

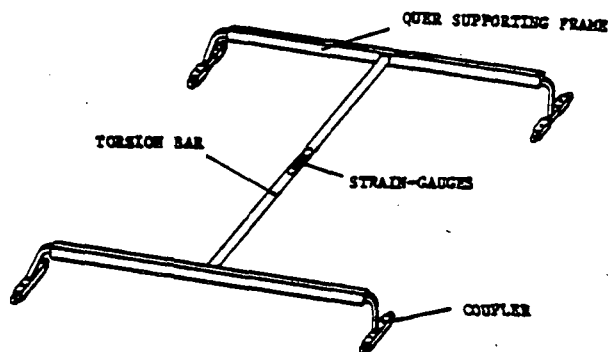


Figure 2. A view of strain gauge measurement device (RMD - Roof Measurement Device).

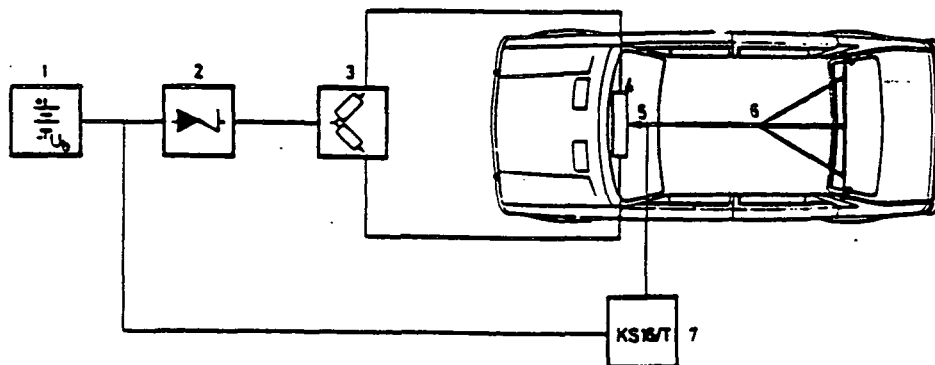


Figure 1. Block diagram of potentiometer - transducer and classifier.

for an adequate measurement system. We also developed, simultaneously, a similar measurement device which was attached under the floor of the car body - FMD (Floor Measurement Device).

In both cases the two strain gauges were placed at 45° in reference to the long axis of the torsion bar. Static and dynamic load conditions are applied by evaluation of the proposed measuring devices.

Figure 3 shows schematically how three devices under consideration are supported in the laboratory static testing and calibration procedure. The testing of the developed measurement systems showed that the strain gauge torsion frame system attached to the car roof-designated RMD has significant advantages. All three measurement devices accurately followed the elastic deformations of the car body and showed good linearity. The measurement device on the car roof - RMD - had the best sensitivity and controllability during the road tests, and was simple in design.

In this investigation we used the RMD; its calibration was performed by laboratory testings of the car body on the torsion deformation. The bare car body was fixed on its rear part, while on the front part a torsion moment was applied, see Figure 3. The angle α of torsion

deformation was followed and recorded simultaneously by means of a light beam and by the developed RMD. In Figure 4 the

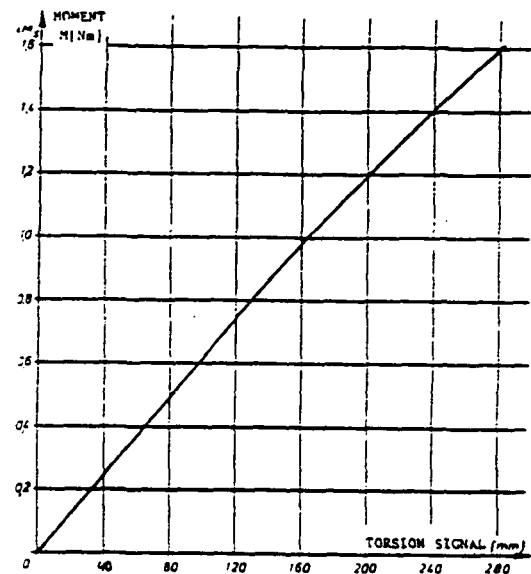


Figure 4. Dependence on the moment and torsion deformation (bare body on shake table).

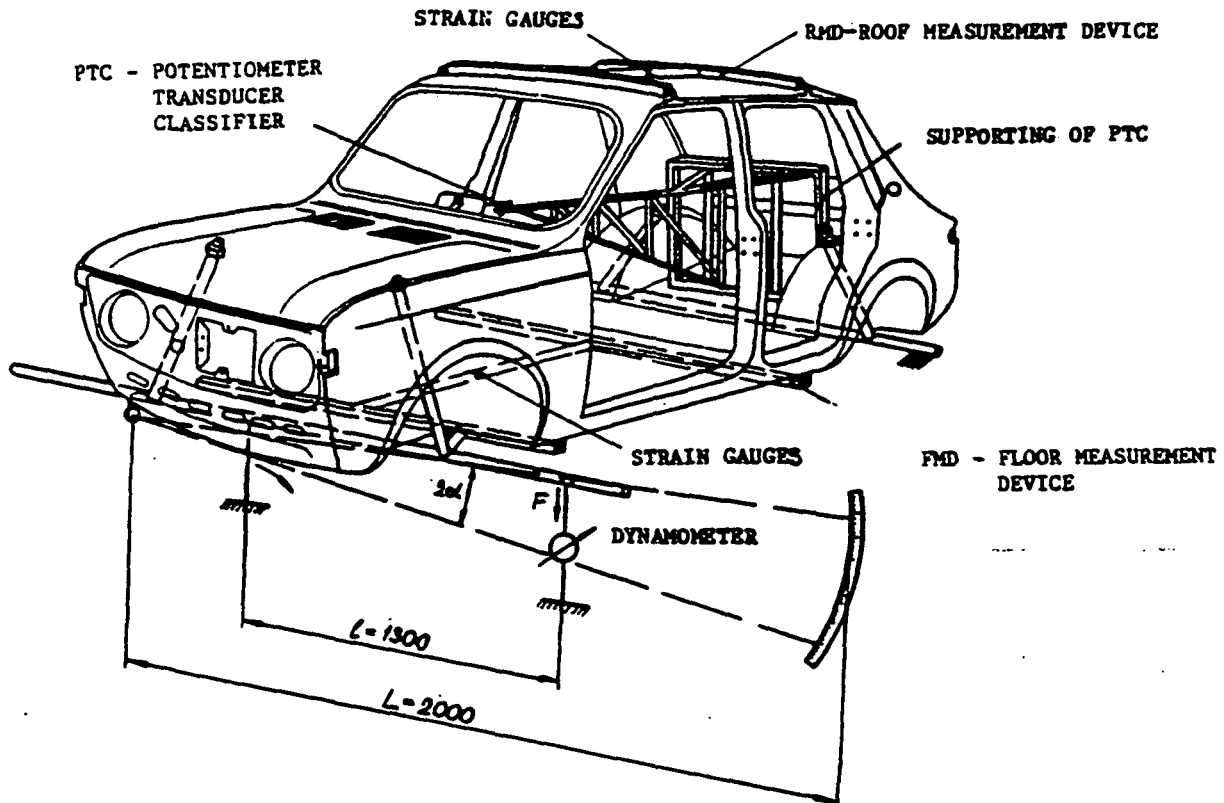


Figure 3. Positions and view of three developed devices for torsion deformation measurements.

relationship is shown between torsion moment "M" and angle of torsion deformation "α" for the bare car body. The relationship can be described by

$$M = k\alpha$$

where

M - applied torsion moment,
k - torsion stiffness and
α - angular displacement; signal
of torsion displacement

This relationship shows the total linearity on the moment range from 0 to $0.8 M_s$, where M_s represents the static moment. It is defined as the product of the front wheel track and front wheel static load, see Figure 5.

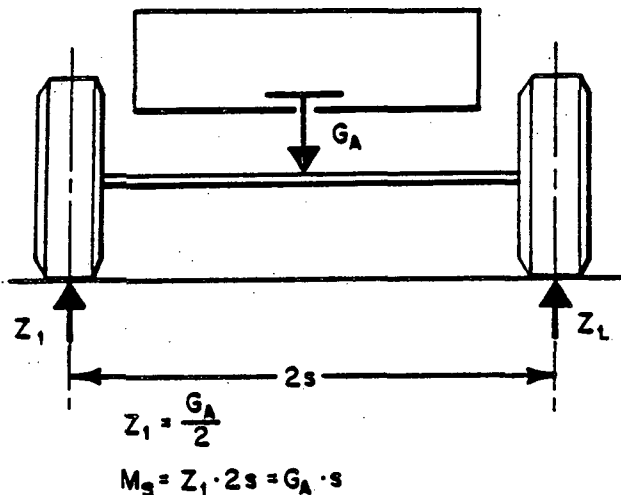


Figure 5. Definition of static moment - M_s .

The total weight of vehicle-1,155 kg-was divided by 593 kg on the front wheels and 563 kg on the rear wheels. The total weight included the co-driver and measuring equipment.

TORSION DEFORMATION OF ACTUAL OPERATING CONDITIONS

The block diagram of the measurement system used in the road testing condition is shown in Figure 6. The road tests are conducted on the 860 km length of mixed Yugoslav roads, which included six typical classes of roads. The torsion deformation signal was recorded approximately every 10 km for a distance of 1 to 2 km. This distance was chosen because it provided a sufficient number of cycles, which enabled accurate statistical evaluation of the results. The signal of torsion deformation was recorded for 86 sections of the road. Each section was recorded (number of section, location, average speed, quality

of the road surface, road configuration, etc.). The speed of the tested vehicle was always adjusted by the driver depending on real operating conditions. (The road configuration, road surface quality, traffic and weather conditions).

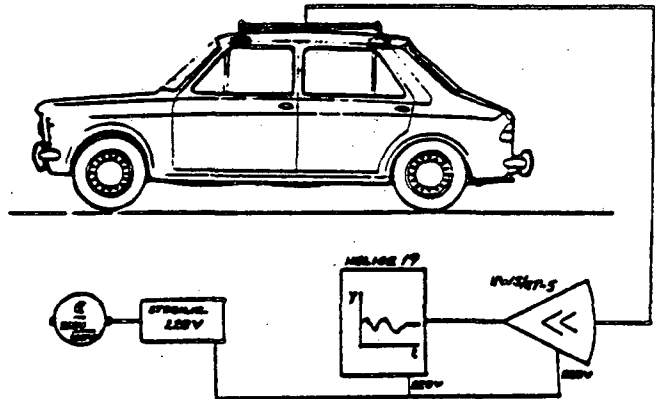


Figure 6. Block diagram of measurement system in road testing conditions.

In Figure 7, several torsion deformation signals of the car body are

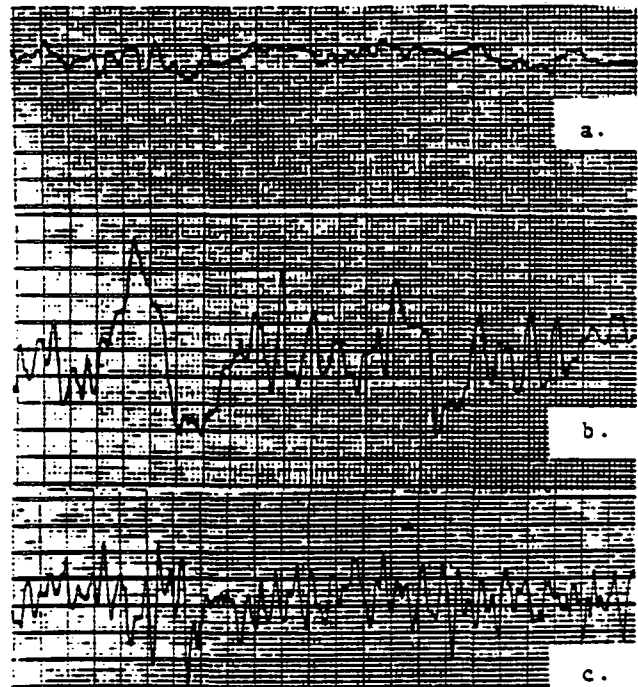


Figure 7. Road record examples.

- a. Good asphalt with curves
Mean speed $V = 58 \text{ km/h}$
Sensitivity: 100

- b. Asphalt in average condition with sharp curves
Mean speed $V = 52.5$ km/h
Sensitivity: 200
- c. Paving break and asphalt in average condition
Mean speed $V = 42.3$ km/h
Sensitivity: 200

shown. The contents of the recorded signal are evaluated by using "the method of counting of the peaks" and "the method of passing the levels". Before starting the road tests, the "zero level" was defined by driving on a plain and straight road in excellent conditions.

All roads are classified as follows:

- Class 1: Asphalt-concrete roads in good condition.
- Class 2: Asphalt-concrete roads in good condition with occasional and partially distributed waves.
- Class 3: Asphalt roads in average condition and paving break in good condition.
- Class 4: Paving break and asphalt, both in bad condition.
- Class 5: Very bad paving break conditions and destroyed asphalt.
- Class 6: Very bad village roads and off road fields.

Maximum amounts of the recorded torsion deformation signals were within the following limits, according to the road classes;

Class 1: < 24 mm	Class 4: < 78 mm
Class 2: < 42 mm	Class 5: < 120 mm
Class 3: < 66 mm	Class 6: > 120 mm

The results of the the different sections and single classes of roads are collected, and the data for cumulative number of cycles are obtained separately for each class of roads.

In Figure 8, the levels of distribution of the torsion deformation for 1 km of the road are represented. It is obvious, that the quality of the road plays an important part in the results.

The maximum torsion moment loads for single classes of the roads are:

Class 1: $0.15 M_g$	Class 4: $0.49 M_g$
Class 2: $0.26 M_g$	Class 5: $0.75 M_g$
Class 3: $0.42 M_g$	Class 6: $0.86 M_g$

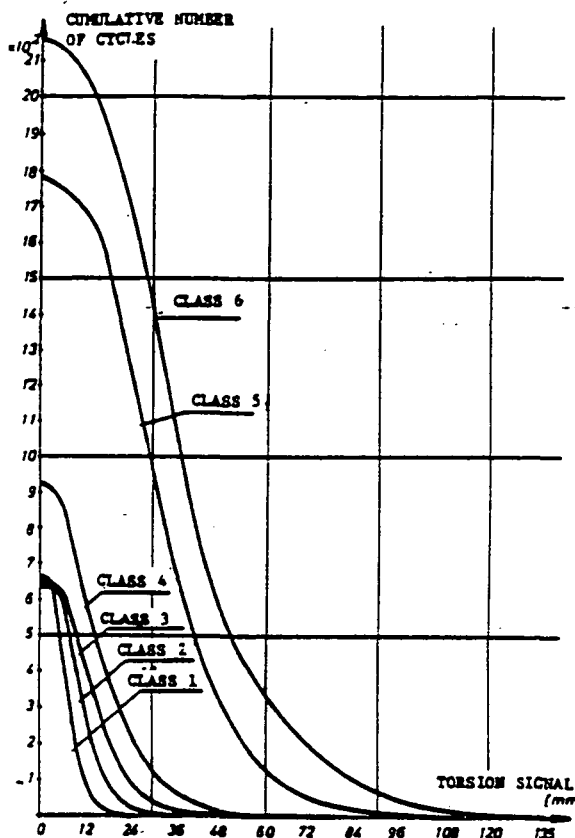


Figure 8. A level distributions of torsion deformations and road classes.

DETERMINATION OF A CAR BODY LIFE

The fatigue curve was determined in the laboratory on the torsion vibration generator system. Eleven car bodies were exposed to sinusoidal torsion moments, three of them in pilot-experiments and eight of them in main-experiments. Each car body was exposed to different but constant torsion moment levels.

$$M = KM_g \sin \omega t.$$

where KM_g are torsion moment amplitudes. The torsion moment range was between $0.5 M_g$ to $1.3 M_g$.

The number of load cycles until the first crack appeared—"crack initiation"—on the car body, was assigned as the point which defines the body life. That is in accordance with the fatigue phenomenon and analysis, which can only predict the life cycle for first crack initiation, and in some cases we may control crack propagation. As a matter

of fact, the first crack initiation usually does not endanger significantly the longer future usage of a vehicle. The data for the fatigue curve in Figure 9 are shown. The body endurance limit is defined by a torsion moment level of $0.5 M_s$.

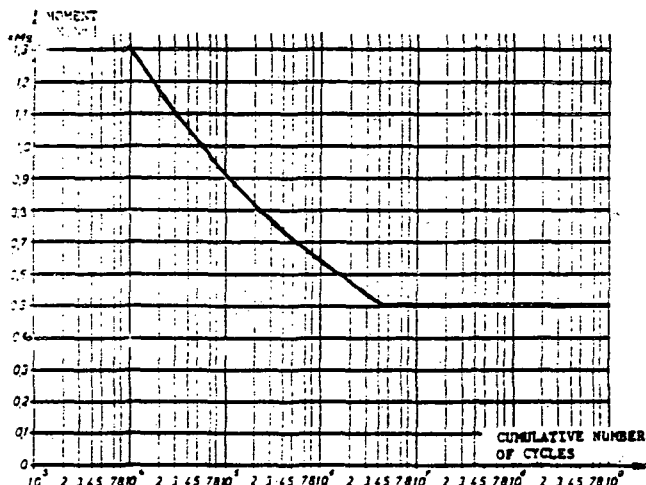


Figure 9. Fatigue curve of car body.

From the above given analysis, it is obvious that the first three road classes generate torsion deformation levels which are less than the determined endurance limit. This means that the levels below the endurance limit could not be a relevant, or a dominant factor in determining the method for accelerated testing. For establishing the method of accelerated testing of body structure we have to take in account only the last three classes of the roads and desired life of the body.

SUMMARY AND CONCLUSIONS

1. The torsion dynamic loads are pointed out as decisive by simplified laboratory determination of the car body life cycle.
2. Three torsion measurement devices are developed and tested. Very simple strain-gauge measurement devices attached on the roof showed excellent results, and were used in these experimental investigations.

The RMD (Roof Measurement Device) could be the baseline for the further development of car body torsion measurement system.

3. On the mixed Yugoslav roads for the entire length of 850 km, the torsion deformations were recorded on 85 one-km

road sections. The dynamic torsion loads are expressed in units of "static moment - M_s ", which is introduced and assigned as the reference amount. It might be convenient by comparative analysis of different car bodies.

4. The results in the form of load - amplitudes distribution curves, depending on the class of the road, enable one to determine the relationship between static torsion moment and different torsion dynamic load levels.
5. Eleven car body structures were exposed to sinusoidal torsion moments and recorded the number of load cycles until the first crack initiation appeared, which was defined as the car body life cycle.

The fatigue curve is described by the relationship $M^n N = \text{const.}$, with $n = 6.47$, and the endurance limit is determined by $M_0 = 0.5 M_s$.

6. The experimental fatigue data obtained gives a real base for the development of methods in accelerated laboratory tests. The classified torsion loads depending on the road classes enable to predict the load-spectrums for different usages of the car.

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- (6) Kamal, M. M. and Wolf, A. J. Modern Automotive Structural Analysis, Van Nostrand Reinold Company, 1982.

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

MAY 14 1985

ASSOCIATESHIP
OFFICE

Date: 04 28 86

Associate Name: Rajeshuni Ramesham

Laboratory: Jet Propulsion Laboratory, 122-123, 4800 Oak
Grove Dr. Caltech

Location: Pasadena, CA - 91109

Starting Date of Tenure 31st Oct. 1985

Adviser Name: Satish K Khanna

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	—
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	—	—
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	—
4. Is the stipend being received regularly in a timely way?	<u>X</u>	—
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	—
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	—

Comments:

over...

2/5/85

99

II. Laboratory functions

Yes No

- | | | |
|---|-----------|-----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>X</u> | <u> </u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>X</u> | <u> </u> |
| 3. Is the space assigned reasonably adequate? | <u>X</u> | <u> </u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u> </u> | <u>X</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>X</u> | <u> </u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>X</u> | <u> </u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>X</u> | <u> </u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u> </u> | <u>X</u> |

Comments:

Brief resume of progress:

Progress report has been enclosed.

General impression of program to date:

It provides a good exposure to the candidate. I am enjoying the type of work which I am carrying out.

Suggestions:

SIX MONTH PROGRESS REPORT

I'm writing this progress report as requested as to my involvement in the corrosion resistant magnetron sputtered amorphous metallic coatings project at JPL. The first few days after my arrival (31 October 1985) I spent familiarizing myself with JPL practices and procedures. My initial project has been to deposit and characterize MoCrB. This material should have very good corrosion properties, since Cr is a well known passivating agent. This material is a good candidate to quantitatively determine the very low corrosion rates observed for these coatings.

Amorphous metallic films of $\text{Mo}_{49.2}\text{Cr}_{32.8}\text{B}_{18}$ have been prepared by dc magnetron sputtering technique using research US gun on glass and quartz substrates. The corrosion behavior of these films in $\text{H}_2\text{SO}_4(\text{IN})$ solution have been studied by potentiodynamic and galvanostatic techniques and compared with crystalline 304 stainless steel in $\text{H}_2\text{SO}_4(\text{IN})$. Sputtered MoCrB showed three orders of magnitude lower corrosion rate compared with 304 stainless steel. The amorphous nature of the as-deposited films was confirmed by their diffuse x-ray diffraction pattern. Differential thermal analysis has been performed with amorphous $(\text{Mo}_{0.6}\text{Cr}_{0.4})_{82}\text{B}_{18}$ metallic glass films. They exhibit crystallization temperature is of the order of 590°C . They have also been cross-checked by x-ray diffraction patterns as a function of temperature by thermo-mechanical analysis and also by Resistance Variation as a function of temperature. But it was not accurate enough to detect the transition temperature by TMA. Resistance variation as a function of temperature has not been completed successfully since there were many problems of electrical contacts during resistance measurements at high temperature. Secondary ion mass spectrometry (SIMS) analysis

shows that the films are chemically homogeneous. Scanning electron micrographs of a fracture cross section of as-deposited $(\text{Mo}_{0.6}\text{Cr}_{0.4})_{82}\text{B}_{18}$ film shows that the structure is not columnar. Topographical studies by SEM shows that as-deposited films appear to have small gas bubbles probably due to the gas entrapped in it during sputtering process. Chemical composition of the film has been studied by electronmicroprobe, and inductively coupled plasma technique. Result shows that it is slightly different from target composition. Micro-hardness measurements were done with Knoop hardness tester results about 600-850 HV_{100} .

My secondary project on corrosion resistant amorphous metallic coatings has been to deposit MoCrPC. Various compositional studies have been made, but the results were not encouraging. To alleviate this problem molybdenum has been replaced by Ti in MoCrPC. Composition of chromium and phosphorous has been optimized to obtain a composition with very good corrosion resistant properties. Optimized composition of this alloy is $\text{Ti}_{59}\text{Cr}_{30}\text{P}_5\text{C}_6$. Differential thermal analysis has been performed with $\text{Ti}_{59}\text{Cr}_{30}\text{P}_5\text{C}_6$ metallic glass films. They exhibit crystallization temperature is of the order of 575°C . Pressure parameter has not been optimized yet. But the films deposited at 7 ± 1 mTorr shows that they are columnar in structure by scanning electron microscope. Number of pin-holes are less in this case. Corrosion behavior of these films in H_2SO_4 IN solution has been studied by potentiodynamic technique and shows very promising characteristics.

I have also attempted to replace P in TiCrPC by B since there are many practical problems involved in using elemental P. Corrosion behavior of these films in H_2SO_4 (IN) solutions has been studied by potentiodynamic technique. Studies of other properties is under progress.

Amorphous metallic films of FeCrP, FeCrPC, MoTiB, FeCrRuP have been deposited on glass by dc magnetron sputtering technique using reserach US gun, and their corrosion behavior was investigated by potentiodynamic polarization technique. These materials all show high corrosion resistance, but the FeCrPC still appears optimum. During this period the improved high temperature corrosion set-up has been fabricated and testing is under progress. Initial attempt has been made to study corrosion behavior of 304 stainless steel in $H_2SO_4(IN)$ at $100^{\circ}C$. There are many problems associated with reference electrode. A reliable assessment has been made to use Ag/Ag_2SO_4 reference electrode to use at high temperature. A modification is required in the shape of the reference electrode. It will be tried with this fortnight. High temperature study of corrosion of as-deposited amorphous metallic glass films will be studied in the forthcoming quarter.

I have also been involved in some of the other electrochemical corrosion projects here at JPL, such as the determination of corrosion rates in low conductivity solvents. Corrosion behavior of 304 stainless steel and Hastelloy B2 in contact with anhydrous Hydrazine (low conductivity propellant) has been studied by potentiodynamic and A.C.-impedance techniques. Preliminary results indicate that these methods may be developed into accelerated test methods for materials compatibility with propellants. We plan to present these results at the fall Electrochemical Society meeting in San Diego.

75-Word Abstract Form

Extended Abstract must be submitted with the 75-Word Abstract by May 1, 1986

San Diego, California—October 19-24, 1986

Submit to: The Electrochemical Society, Inc.
10 South Main Street, Pennington, NJ 08534-2896
With a copy to the Organizing ChairmanAbstract No.
(to be assigned by the Society)Schedule for General Session
(Title of Symposium)Sponsored by Corrosion
(Division/Group)Title of paper Physicochemical Properties of Magnetron Sputter Quenched Amorphous
..... Metallic Glass Films of MoCrB.Authors (Underline name of author presenting paper.) R. Ramesham, S. Di Stefano, D. Fitzgerald, S.K.
..... Khanna, and A.P. Thakoor

Business affiliation and address Jet Propulsion Laboratory, 4800 Oak Grove Dr., Pasadena, CA 91109

..... (818) 354-6320
(State or Country) (ZIP Code) (Telephone No.)

(Type abstract in this area—double-spaced.)

Amorphous metallic thin films of compositions based on Fe, Mo and metalloids B, C, P have been deposited by magnetron sputtering onto glass substrates. Physical, morphological and chemical properties have been determined. For example, thin films of the molybdenum based alloy of composition $\text{Mo}_{52}\text{Cr}_{36}\text{B}_{12}$ were characterized by dense amorphous structure as determined by x-ray diffraction and SEM. These films exhibit a phase transition at $\sim 590^\circ\text{C}$, and microhardness of the order of 600–850 HV. Polarization curves in $1\text{N H}_2\text{SO}_4$ exhibit formation of a passive film with minimum passive current of 10 to $20\mu\text{A}/\text{cm}^2$. Tafel plots obtained galvanostatically were extrapolated to yield a corrosion current density of $270\text{nA}/\text{cm}^2$. Experimental details as well as chemical and structural data of films with this and other compositions will be presented.

Do you require any audiovisual equipment?

- ☐ 35 mm (2 x 2 in.) slide projector
☐ Vu-Graph
☐ Specify other (subject to availability and cost)

Has the information in this abstract been
presented verbally, submitted for publication,
or published?☐ Yes ☒ NoIf the answer is yes, please provide the
reference (except in the case of invited review
presentations).Is a full length paper on this work to be submitted for Society Journal publication? ☒ Yes ☐ No

Papers presented before a Society technical meeting become the property of the Society and may not be published elsewhere without written permission of the Society. Papers presented at Society technical meetings must be authored by a member or sponsored by an active member.

..... S. Di Stefano
Insert name of Society member author or sponsor

75-Word Abstract Form

Extended Abstract must be submitted with the 75-Word Abstract by May 1, 1986

San Diego, California—October 19-24, 1986

Submit to: The Electrochemical Society, Inc.
10 South Main Street, Pennington, NJ 08534-2896
With a copy to the Organizing Chairman

Abstract No.
(to be assigned by the Society)

Schedule for General Session
(Title of Symposium)

Sponsored by Corrosion
(Division/Group)

Title of paper ... Propellant-Materials Compatibility: Electrochemical Corrosion Studies
in Liquid Propellants.

Authors (Underline name of author presenting paper.) S. Di Stefano, R. Ramesham, E. Lawton, C. Moran,
and G. Blue

Business affiliation and address Jet Propulsion Laboratory

4800 Oak Grove Drive

Pasadena, CA 91109
(State or Country)

(ZIP Code)

(818) 354-6320
(Telephone No.)

(Type abstract in this area—double-spaced.)

Compatibility of propellants with spacecraft materials is a topic of much interest to the Aerospace community. Because these materials (Hydrazine, Nitrogen-tetroxide) are toxic, highly reactive and have low conductivities, only long term real-time compatibility studies have been possible. This paper will present results of electrochemical studies of the corrosion of metals by hydrazine. Corrosion rates of CRES 304L and Hastelloy B2 have been measured by D.C. techniques and A.C. Electrochemical Impedance Spectroscopy. Preliminary results indicate that even in low conductivity media ($\sim 4 \times 10^{-5} \Omega^{-1} \text{cm}^{-1}$) valid measurements are possible. For D.C. measurements, it is the ratio of the solution resistance R_s to the polarization resistance R_p which determines the error due to IR-drop. Comparison of corrosion rates will be presented.

Do you require any audiovisual equipment?

- ☐ 35 mm (2 x 2 in.) slide projector
☒ Vu-Graph
☐ Specify other (subject to availability and cost)

Has the information in this abstract been presented verbally, submitted for publication, or published?

☐ Yes ☒ No

If the answer is yes, please provide the reference (except in the case of invited review presentations).

Is a full length paper on this work to be submitted for Society Journal publication? ☒ Yes ☐ No

Papers presented before a Society technical meeting become the property of the Society and may not be published elsewhere without written permission of the Society. Papers presented at Society technical meetings must be authored by a member or sponsored by an active member.

S. Di Stefano
Insert name of Society member author or sponsor

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

MAY 15 1986

ASSOCIATESHIP
OFFICE

Date:

Associate Name: Martin F. Woodward

Laboratory: Jet Propulsion Laboratory

Location: 4800 Oak Grove Dr
Pasadena, Ca 91109

Starting Date of Tenure July 1, 1986

Adviser Name: Edward J. Smith

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|---|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | — |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | — | — |
| 3. If requested, was the stipend advance available when you began tenure? | — | — |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | — |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>X</u> | — |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | — |

Comments:

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>—</u>	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>—</u>	<u>X</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>X</u>

Comments: Have ~~been~~ been rather frustrated for much of the past year, either because of delays in getting reduced data to work on, or because I was pressured into doing tests that were more related to improving the image of the Mt. Wilson solar oscillations group and ~~not~~ directly aimed at getting state-of-the-art research results. This situation is beginning to improve, I think.

Brief resume of progress: Have written software for, and performed, a preliminary analysis of the Mt. Wilson solar Doppler image data, to investigate the rotational rate of the solar interior. Have analyzed further ACRIM solar irradiance data, showing a continued decrease in the frequencies of ~~the~~ low-degree solar p-modes with the solar cycle. Am getting involved in design work for a space craft solar oscillations experiment.

General impression of program to date:

To a large degree a 'can't get a stick' game, at least in my case. I feel that too little consideration has been given to getting meaningful research results within my period of tenure, but with some determination on my part the situation ~~may~~ might ~~be~~ change.

Suggestions:

RECEIVED

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

APR 4 1986

SIX-MONTH PROGRESS REPORT

ASSOCIATESHIP
OFFICE

Date:

Associate Name:

KATSUYA ISHII

Laboratory:

NASA Langley Research Center

Location:

Hampton, VA 23669

Starting Date of Tenure

September 16, 1985

Adviser Name:

Richard J. Margason

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|----------|
| 1. Were the ore-start materials and instructions satisfactory? | <u>X</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>X</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>X</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>X</u> | <u>—</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | <u>—</u> |

Comments: -

over...

2/5/85

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>—</u>	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>X</u>

Comments:

Brief resume of progress:

The interaction between vortex rings and a background shear flow has been analyzed by the asymptotic expansion method. A numerical scheme based on this analysis is currently in development. In addition, a numerical code has been developed for the calculating the velocity field for the motion of the three dimensional viscous vortex filaments.

General impression of program to date:

The application of the singular perturbation methods to 3-D viscous vortex flows and its numerical calculations by using supercomputer VPS-32 have stimulated me into the advanced analytical and numerical vortex methods. It can be expected that useful results about the understanding of the fluid physics for three dimensional vortices will be obtained.

Suggestions:

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

APR 15 1986

ASSOCIATESHIP
OFFICE

Date: April 15, 1986

Associate Name: N. M. REDDY

Laboratory: NASA-Langley Research Center

Location: Hampton Virginia 23666

Starting Date of Tenure 15 Oct 85

Adviser Name: C. G. Miller

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>✓</u>	<u>—</u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>✓</u>	<u>—</u>
3. If requested, was the stipend advance available when you began tenure?	<u>—</u>	<u>✓</u>
4. Is the stipend being received regularly in a timely way?	<u>✓</u>	<u>—</u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>—</u>	<u>* —</u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>✓</u>	<u>—</u>

Comments:

* Promptly but not to my entire Satisfaction.

over...

2/5/85

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OF POOR QUALITY

II. Laboratory functions

Yes No

1. Was the laboratory ready to receive you and help you get started? ✓ —
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? ✓ —
3. Is the space assigned reasonably adequate? ✓ —
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? ✓ **
If so, explain below.
5. Are you being encouraged to plan for publication of your research results in referred journals? ✓ —
6. Are you able to participate in local seminars, colloquia, etc.? ✓ —
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? ✓ —
8. Have you encountered laboratory influences detrimental to your proposed research? Explain. ✓ —

Comments:

~~_____~~
 ** All the support items mentioned above in item 4 are provided by the laboratory. But I am very much inconvenienced due to lack of franking facilities. This may be considered by NRC at the earliest.
 Brief resume of progress:

Seperate Sheet Enclosed

General impression of program to date: *Good.*

Suggestions:

REVIEW OF RESEARCH

1. Introduction

Spacecraft and rockets flying through the atmosphere at very high speeds experience high-heating loads. The level of these heating loads are also strongly affected by the chemistry of the atmosphere which undergoes significant changes due to very high gas temperatures developed during hypersonic flight. The present investigation is designed to measure, rather very accurately, the heating distributions over spheres and blunt cones by simulating in the laboratory, these adverse heating loads as well as the real gas effects. This involves use of two existing hypersonic wind-tunnel facilities at Langley Research Center.

2. Progress to Date:

a. Some existing heat-transfer data of spheres has been carefully analyzed and it showed that there are significant real-gas effects. To investigate this effect in more detail, series of tests are now being conducted in CF₄ Hypersonic Wind Tunnel at $M_\infty = 6.0$.

b. The model fabrication as well as instrumentation of four blunt (70° ~~half-angle~~ half-angle) cone models is completed. These models will be tested in CF₄ and Mach 6 (air) Hypersonic Wind Tunnels to measure the heating-load distributions accurately. These measured heating-distributions will be compared with theory in order to evaluate the interaction effects at hypersonic speeds. These tests are scheduled in May-June 1986.

M. L. Loh
15 April 86

NATIONAL RESEARCH COUNCIL
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SIX-MONTH PROGRESS REPORT

RECEIVED

MAR 27 1986

ASSOCIATESHIP
OFFICE

Date: 3/25/86

Associate Name: NAROTTAM P. BANSAL

Laboratory: NASA - Lewis Research Center

Location: Cleveland, OHIO

Starting Date of Tenure Sept. 30, 1985.

Adviser Name: Dr. J. L. Smialek (and Dr. S. R. Levine).

I. Associateship Office Functions

Yes No

- | | | |
|---|-------------------------------------|--------------------------|
| 1. Were the pre-start materials and instructions satisfactory? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. If requested, was the stipend advance available when you began tenure? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4. Is the stipend being received regularly in a timely way? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Comments:

The staff of the Associateship Office is very courteous, efficient and helpful. All my enquiries are being handled promptly and in a highly satisfactory manner.

over...

2/5/85

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OF POOR QUALITY

II. Laboratory functions

Yes No

- | | | |
|---|----------|----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>✓</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>✓</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>✓</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>✓</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>✓</u> | <u>—</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>✓</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>✓</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>✓</u> |

Comments:

The procurement process is somewhat slow here at NASA-Lewis.

Brief resume of progress:

Various chemicals, apparatus, equipment, etc. have been procured. The equipment is being set up and tested for use in my research work. Gel samples of some glass systems have been prepared by the sol-gel technique.

General impression of program to date:

It is a very good program. It helps the Associate to work independently on a research problem of his/her own choice.

Suggestions:

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

MAR 4 1986

ASSOCIATESHIP
OFFICE

Date: 2/24/86

Associate Name: CHIUN-HSUN CHEN

Laboratory: NASA

Location: Lewis Research Center

Starting Date of Tenure 7/3/85

Adviser Name: Fred J. Kehl

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	—
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	—	—
3. If requested, was the stipend advance available when you began tenure?	—	—
4. Is the stipend being received regularly in a timely way?	<u>X</u>	—
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	—
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	—

Comments:

N/A

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>—</u>	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>X</u>	<u>—</u>

Comments:

N/A

Brief resume of progress:

I have finished the first part of proposal. A draft manuscript entitled "Diffusion Flame Extinction in Slow Convective Flow Under Microgravity Environment" for above work is under review by a committee in NASA LERC. The abstract is included for General impression of program to date: 1986 ASME WINTER SYMPOSIUM.

I am very satisfied with the treatment, atmosphere and facilities for both NRC and NASA LERC. And I hope it can make more contribution during the tenure as a NRC/NA.

Suggestions:

Research Advisor

N/A

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

Date: 3/24/86

Associate Name: Shuji Hattori

MAR 27 1986

Laboratory: NASA Lewis Research Center

ASSOCIATESHIP
OFFICE

Location: Cleveland, Ohio

Starting Date of Tenure 9/25/86

Adviser Name: Donald H Buckley

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|----------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>✓</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>—</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>✓</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>✓</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>—</u> | <u>✓</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>✓</u> | <u>—</u> |

Comments:

I hope IAP-66 should be included with the pre-start materials for the associates from ^{foreign} ~~foreign~~ countries.

Travel reimbursements was so late. It took almost four months after beginning the tenure.

over...

2/5/85

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II. Laboratory functions

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>✓</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>✓</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>✓</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>✓</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>✓</u> | <u>—</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>✓</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>✓</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>✓</u> |

Comments:

None.

Brief resume of progress:

I wrote a rough draft titled "Plastic Deformation of a Magnesium Oxide (100) surface produced by amorphous" and submitted to the ASME-ASLE joint conference for presentation to be held in late October 1981. I continue the research being sponsored by the NRC.

General impression of program to date:

Pretty good and comfortable.

Suggestions:

None.

APR 7 1986

ASSOCIATESHIP
PROGRAM

NATIONAL RESEARCH COUNCIL ASSOCIATESHIP PROGRAM - SIXTH MONTH REPORT

- ROBERT H. CARR

1st APRIL 1986

NASA JOHNSON SPACE CENTER
HOUSTON, TX 77058

TENURE 10/1/85 - 9/30/86

- RESEARCH ADVISOR: Dr. E.K. GIBSON Jr.

TRAVEL ON TENURE: Attended 17th Lunar Planetary Science Conference in
Houston March 17th - 21st 1986

WORK IN PROGRESS: Initial work has focussed largely on familiarisation and reorganisation of existing analytical systems. A number of improvements have already been made and others will hopefully be ready for incorporation in the coming weeks. Periods of instrument "downtime" have, unfortunately, delayed progress on the primary research objective viz. laser microprobe / mass spectrometric analyses of Archean samples but, at this time, it is believed that analyses can begin again in earnest shortly. Meanwhile, collaborative studies with colleagues at the Open University in England have been continuing so that other aspects of the project are well in hand.

PROGRAM APPRAISAL: The Associateship program undoubtedly provides a marvellous opportunity for me to increase my research experience and I am pleased to be able to take full advantage of it. Generally, I have found the organization of the Program to be entirely satisfactory and have no cause for complaint. One minor point that might be worthy of consideration is in regard to the reimbursement of relocation expenses at the start of tenure. As a "foreigner", with no credit history in the USA and because of the necessity for many "upfront" payments in the first few weeks in a new place, shortage of funds becomes a real concern. The initial advance from the NRC goes some way to alleviating the problem, but I was wondering whether relocation expenses for non-US citizens could be made a "special case" and hurried through the administrative procedure. I know that my own personal situation would have been eased by this, although I was unlucky enough to have my first pay check returned to Washington by the Post Office which made things worse.

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

MAR 27 1986

Date: 16 March 1986

Associate Name: David W. Mittelfeldt

ASSOCIATESHIP
OFFICE

Laboratory: Johnson Space Center, Experimental Planetology
Branch

Location: Houston TX

Starting Date of Tenure
9.23.85

Adviser Name:
L. E. Nyquist

I. Associateship Office Functions

Yes No

- | | | |
|---|------------|----------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>N/A</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>X</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>X</u> | <u>—</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | <u>—</u> |

Comments:

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	—
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	—
3. Is the space assigned reasonably adequate?	<u>X</u>	—
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>X</u>	—
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	—
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	—
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	—
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	—	<u>X</u>

Comments:

The ISC staff has been extremely helpful in giving me access to the facilities available.

Brief resume of progress: I have selected the samples for study and have started the petrologic study of thin sections made from them. Two samples have been prepared for chronologic work and the isotopic measurements are in progress. Preliminary age data, petrologic constraints and ~~chem~~ compositional information. These two samples were reported at the 17th Lunar and Planetary Science Conference. I have also pursued thermodynamic modeling relevant to the genesis of my samples. General impression of program to date: the preliminary calculations suggest that this approach will be useful in understanding origin of metagranites.

I find the NRC program to be the most valuable time I have spent in my career. Because 100% of my time is devoted to the project, I am better able to dig into the literature on the subject and pursue subsidiary, related topics.

Suggestions: